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Science and Heritage

Report with Evidence

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(Q) refers to a question in the oral evidence

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ABSTRACT

Our cultural heritage is a legacy left to us by our forebears, which we in turn have a duty to pass on to our descendants. That heritage is in large part embodied in physical artefacts—buildings, works of art, books, landscapes—which exist in a constant state of change or decay. Conservation may be defined as a cautious approach to the management of this change.

Such conservation presents a fascinating, rich and diverse range of scientific challenges, which we have brought together under the heading “heritage science”. The United Kingdom has a high reputation in the field, based in large part on past achievements—in particular in the development of science-based conservation in the National Gallery and British Museum in the mid-twentieth century. However, our standing is now under threat, the sector fragmented and under-valued.

The Department for Culture, Media and Sport has completely failed to grasp the threat to heritage science, and thus to conservation. It delegates conservation and heritage science to its non-departmental public bodies, while itself focusing on widening public access to our cultural heritage. This is short-sighted. Wider access, while desirable in itself, means more damage, more wear and tear. We hold our cultural heritage not just for ourselves, but for our descendants. Furthermore, heritage is a major and ongoing contributor to national wealth—tourism provides employment for over two million people, some seven percent of all employment. Therefore the Government’s own policy on sustainability, applied to the heritage sector, requires that effective conservation, based on sound science, be given equal priority to public access.

This is our central recommendation: that the Department for Culture, Media and Sport should adopt the need to conserve our cultural heritage for the benefit of future as well as existing communities as a fundamental departmental objective. This objective will then cascade down through the sector as a whole, in particular through funding agreements.

We make further recommendations, addressed variously to the Office of Science and Innovation, the Research Councils, the National Museums and Galleries, the Museums, Libraries and Archives Council and English Heritage. In particular, we call on the heritage sector to come together in developing a broad-based national strategy for heritage science, to be championed at departmental level by the newly-appointed DCMS Chief Scientific Adviser, and co-ordinated administratively by English Heritage, and drawing on input from all bodies active in the sector, including those in Scotland, Wales and Northern Ireland.

We are at a turning-point. Science and technology present a host of exciting opportunities to the heritage sector. They must not be wasted.

Science and Heritage

CHAPTER 1: INTRODUCTION

- 1.1. This report explores an area where science and the humanities overlap. Society is underpinned by its understanding of history, and this in turn is profoundly influenced by the survival of the physical artefacts that embody much of our cultural heritage—buildings, landscapes, works of art, books, and so on. These constitute a legacy left to us by our forebears, which we in turn have a duty to pass on to our descendants. This inquiry has shown us that the conservation of these physical objects presents a fascinating, rich and diverse range of scientific challenges. Equally, science and technology can make a huge contribution not only to preserving our cultural heritage, but to promoting new and exciting forms of public engagement with both cultural heritage and science.
- 1.2. At the same time, the inquiry has exposed a fragmented field, lacking overarching leadership and vision. There have been notable successes: English Heritage, the British Library and National Archives, the Natural History Museum, have all taken a lead in developing strategic priorities for scientific research in their respective fields and in the application of new digital technologies. Individual institutions, such as the British Museum, remain world leaders in particular aspects of science-led conservation. But more broadly, while there are many pockets of scientific activity within the heritage sector, often of exceptional quality, collaboration between them is informal, relying on goodwill and serendipity, while no-one appears able to identify priorities or avoid duplication.
- 1.3. The United Kingdom has a high reputation internationally for excellence in what we have called “heritage science”. However, that reputation, notwithstanding the Culture Minister David Lammy’s claim that “we still remain world leaders”, is founded in large part on past achievements, in particular the development of science-based conservation in the National Gallery and British Museum in the mid-twentieth century, and is now under threat. The field is tiny, career development opportunities limited, and funding for research precarious. Rather than bringing together the arts and sciences in a beneficial collaboration, heritage science appears itself to be in danger of falling between two stools. (Q 434)
- 1.4. These problems are compounded by the Government’s desire to widen public access to our cultural heritage. In itself this is a laudable policy, which we fully support. However, increased access means increased wear and tear—surface erosion, disfigurement from dust accumulation, flaking and cracking from fluctuating humidity and temperature, along with the risk of more immediate and catastrophic damage to precious objects. Thus the implications of wider access need to be carefully considered and reconciled with those of long-term conservation. Securing the maximum possible input from the latest science and technology will be crucial to achieving this reconciliation. This will require money—if not new money, at least the redirection of existing funding, whether for the heritage sector or for scientific research, towards heritage science. The Government must face up

to this reality if we are not to reach a crisis where the precious objects that people most wish to see are lost.

- 1.5. We have therefore made a number of recommendations which we believe are essential to sustain heritage science and thereby to meet the many challenges to the long-term preservation of our cultural heritage. These recommendations are summarised in Chapter 9.

Acknowledgements

- 1.6. The membership of the sub-committee is set out in Appendix 1, and our call for evidence in Appendix 3. We would like to thank all those who submitted written and oral evidence, who are listed in Appendix 2. We would also like to thank all those who welcomed us in our visits to Italy and within the United Kingdom. Notes of these visits are given in later Appendices.
- 1.7. In addition, we were delighted to be able to hold an introductory seminar to this inquiry at Hampton Court Palace in March. We are extremely grateful to the Chief Executive, Mr Michael Day, and the staff of Historic Royal Palaces, for their help in organising this event, and also to all the participants in the seminar itself. A note of the seminar is given in Appendix 4.
- 1.8. Finally, our Specialist Adviser for this inquiry was Professor May Cassar, Professor of Sustainable Heritage at University College London. We are enormously grateful to her for her contribution to the inquiry. However, our conclusions are ours alone.

CHAPTER 2: SCIENCE, TECHNOLOGY AND CULTURAL HERITAGE

The meaning of conservation

- 2.1. Underlying our report is the question, what is conservation? To “conserve” is defined by the Oxford English Dictionary as: “To keep in safety, or from harm, decay, or loss; to preserve with care; now usually, to preserve in its existing state from destruction or change”. Until the eighteenth century “conserve” was essentially a synonym of “preserve”, but in the early nineteenth century the usual modern sense of the word evolved, referring more specifically to interventions designed to ensure the preservation of objects of value.
- 2.2. The Dictionary’s first example of the use of the word “conservation” in the sense of the protection of natural resources, now perhaps the commonest sense of the word, is dated 1922. The emphasis upon the management of a constantly changing resource has since been taken up by the heritage sector, which increasingly acknowledges the fact that the preservation of material objects, however precious, can never be absolute or permanent. Thus the Institute of Conservation (“Icon”) argued that since all matter was in a state of change, conservation was “the management of change” (p. 166). Expanding on this, conservation in the context of this inquiry may be defined as a cautious approach to the management of change of the physical objects that constitute much of our cultural heritage.
- 2.3. This management of change is not undertaken purely for its own sake. Again in the words of Icon, conservation is a matter of “maximising both [the artefact’s] survival and its accessibility”. On the one hand it means doing as much as is necessary to safeguard objects, specimens, buildings and sites for present and future generations. On the other it is about revealing and retaining cultural value and significance in order to enhance understanding and enjoyment of the physical evidence of people and their environment.
- 2.4. The balance within conservation between preservation and access is not uncontroversial. In recent years the emphasis within Government, and consequently within publicly-funded bodies such as the National Museums and Galleries, has increasingly been upon promoting public access rather than upon conservation. Indeed, the Department for Culture, Media and Sport’s Public Service Delivery Agreement for 2003–06 makes no reference to conservation—the Department’s two key PSA targets are to “increase participation in culture and sport”, and to deliver a regulatory framework that will “improve the productivity” of the sector.¹ In short, to extract as many golden eggs as possible, rather than caring for the goose that lays them.
- 2.5. The Culture Minister, Mr David Lammy, when asked whether there was a risk that the promotion of public access might put conservation at risk, was dismissive, responding with a series of rhetorical questions:

“Why are we conserving those wonderful objects in the V&A? Why are we conserving the textiles and costumes? Why are we using the best techniques to conserve the jewellery? ... We are doing it for the many, many people of this country, and we are doing it equally for the people in poorer socio-

¹ See http://www.culture.gov.uk/Reference_library/Publications/archive_2002/dcms_psa_03_06.htm.

economic groups as we are for those who are not. That is why the Government has placed the emphasis it has on access.” (Q 435)

- 2.6. This is an over-simplification. We fully support the Government’s policy on widening public access to our cultural heritage; but the Minister did not appear to acknowledge that the right to access goes beyond the present generation—we have inherited all these “wonderful objects” from previous generations, and hold them in trust to pass on to our descendants. They too will have a right of access, and for them to be able to exercise that right it is essential that the present generation should make every effort to conserve these objects and pass them on intact. It is therefore a matter of grave concern to us that the Department of Culture, Media and Sport’s strategic objectives, while including reference to increased access, make no mention of the accompanying need for conservation of our cultural heritage.²
- 2.7. In summary, conservation requires the exercise of judgement to balance competing interests. In the words of English Heritage, conservation is: “the process of managing change in ways that will sustain the values of a place [or object] in its contexts, and which recognises opportunities to reveal and reinforce those values.” (p. 113)

Scientific and technological input into conservation

- 2.8. Scientific and technological research are essential to determine the nature and properties of the materials found in artefacts, to identify the causes of deterioration, and propose ways in which it may be controlled. However, the scope of such research need not be confined to cultural artefacts. For instance, at our seminar in March we heard a presentation from Dr Heather Viles, of Oxford University, whose research into stone erosion encompasses not just historic buildings, but also natural rock formations from both Earth and Mars. Her work is funded in part by English Heritage, but also by the Engineering and Physical Sciences Research Council, the Natural Environment Research Council and by NASA.
- 2.9. The breadth of Dr Viles’ research is by no means unique. On 28 March we took oral evidence from four university-based researchers, Professor Peter Brimblecombe, Dr Eric May, Professor Mark Pollard and Professor Norman Tennent, who bring to conservation expertise ranging across the environmental sciences, chemistry, physics and microbiology. The potential applications to conservation of the physical and natural sciences, both preventively, for instance in understanding risk and analysing the causes of degradation, and actively, in developing treatments to stabilise the condition of objects and to treat damage, are almost limitless.
- 2.10. The researchers we have just mentioned are all based in universities. Within the heritage sectors, particularly within museums and galleries, scientific input into conservation is determined more directly by the needs of collections. Specific collection conservation projects draw on historical and social research in establishing the cultural significance of particular artefacts, and this means researching documentary and oral history and context, and engaging in dialogue with relevant stakeholders. This is followed by scientific examination of the artefacts and careful recording of their physical condition,

² See http://www.culture.gov.uk/about_dcms.

leading in turn to the development and implementation of a conservation plan. The conservation process is fully documented throughout.

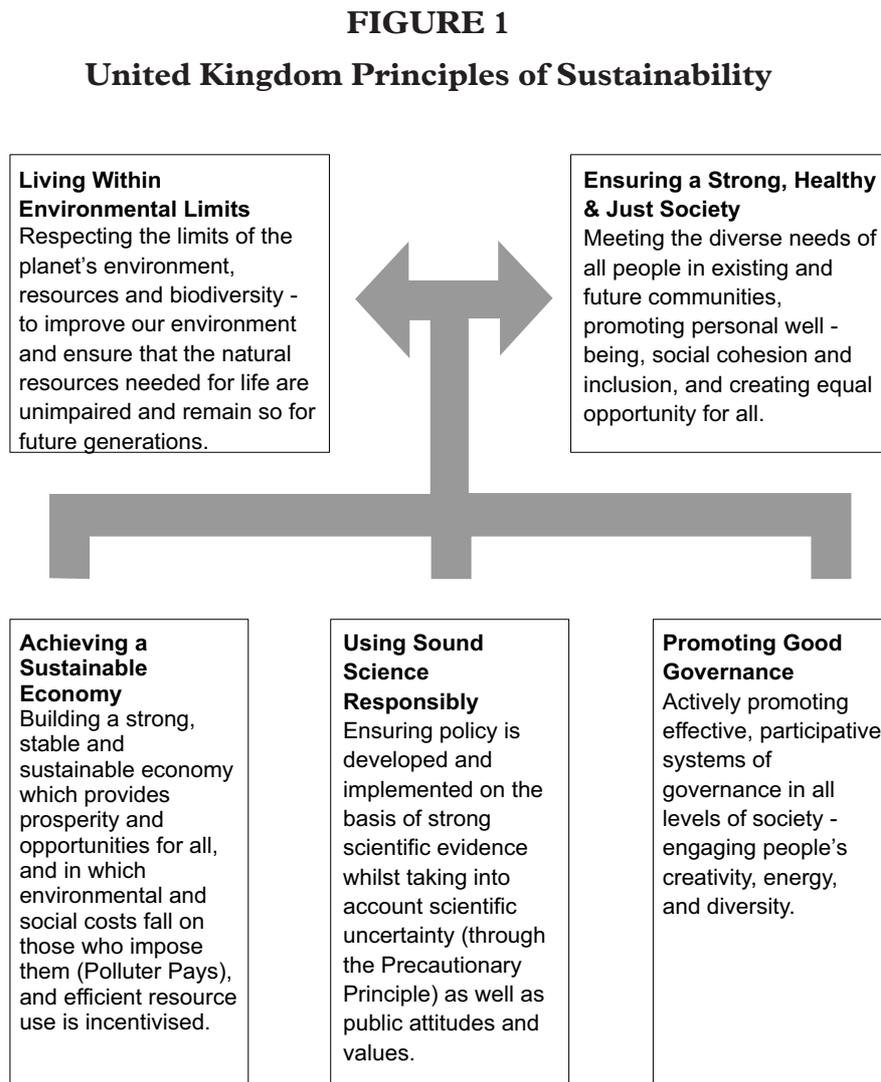
- 2.11. The information gleaned from scientific analysis contributes in turn to our developing understanding of cultural history. Scientific analysis reveals the processes by which works of art were created or can help assign authorship. A celebrated example in recent times was the National Gallery's analysis of the "Madonna of the Pinks", which helped establish Raphael's authorship. Microscopic analysis of a known work by Raphael revealed a characteristic priming layer of lead white with the addition of lead-tin yellow and ground glass, and a very unusual grey tint containing bismuth. The presence of the same paints in a sample from the Madonna of the Pinks proved that the painting was early sixteenth century work, not the nineteenth century forgery that had been suspected previously.
- 2.12. Finally, we draw attention to the role of new technology in facilitating public access to and understanding of cultural artefacts. There are many dimensions to this. The digitisation of records by libraries and archives is of particular importance, both in making records more widely accessible and more readily searchable, and in relieving the wear and tear caused by the physical use of originals. The online publication by the National Archives of census records from 1841–1901, which has contributed to the rapid growth of public interest in genealogical research, is a well-known case in point.³ Such projects require that heritage institutions also be intelligent users of technology. We consider these issues in more detail in Chapter 7 below.
- 2.13. The examples above demonstrate how diverse the scientific and technological input into conservation can be. So diverse, indeed, that the term "conservation science", though widely used, not least in this inquiry, is not really adequate. There is no one accepted definition for "conservation science", and witnesses used the term in various ways.⁴ Some offered alternative terms, such as "museum science" (the National Gallery) and "cultural heritage science" (the Institute of Conservation Science).
- 2.14. In this report we have used the term "conservation science" to cover the scientific work undertaken in museums and galleries, with a view to meeting defined collection needs—such as the analysis of the Madonna of the Pinks. However, the term does not appear to us to cover the full range of science and technology that could potentially benefit the heritage sector. We have therefore adopted a different term, "heritage science", in an attempt to encompass this wider field of scientific activity.
- 2.15. In adopting this term, we wish to underline the benefits of broad-based, collaborative research. The differences between the way science and research are conducted within the heritage organisations and universities (a difference analysed more fully in Chapter 4) mask the fact that scientists in all these institutions have a common objective: to define problems that threaten the survival of cultural artefacts, and to find solutions to those problems. Perceived differences between the goals pursued by these various institutions can only foil potentially fruitful collaborations.

³ See <http://www.nationalarchives.gov.uk/census/>.

⁴ See, for instance, the definitions given in the written evidence from the Institute of Conservation Science (p. 175) and English Heritage (p. 113).

Sustainability

- 2.16. It will be clear from what we have said above that heritage science could be an important contributor to the Government's wider policy on sustainability. The generally accepted definition of sustainable development is "development which meets the needs of the present without compromising the ability of future generations to meet their own needs".⁵ This is precisely analogous to the role of conservation in both promoting public access to cultural artefacts today, and assisting in their preservation for future generations.
- 2.17. One can pursue the analogy further. The shared United Kingdom principles of sustainability, agreed by the Government and the devolved administrations, are set out below:⁶



- 2.18. The heritage sector fits neatly into this paradigm. Not only is cultural heritage enormously valuable in itself, but it is a key contributor to the economy, in particular through stimulating tourism. It has been estimated that heritage generates income in trade and services to Europe of the order of

⁵ See <http://www.sustainable-development.gov.uk/what/index.htm>.

⁶ Source: <http://www.sustainable-development.gov.uk/what/principles.htm>.

£228 billion per year, and assures employment for more than 8,000,000 persons. As for the United Kingdom, in 2003 DCMS estimated that tourism supported the employment of 2.1 million people and contributed 4.5 percent of GDP. Some £38.5 billion was spent by tourists, almost three quarters of them from overseas. For every £1 invested in the maintenance and upkeep of cultural heritage the economy receives back £10, while over 90 percent of the money spent by tourists visiting heritage sites, rather than staying at the site itself, benefits the wider local economy.⁷

- 2.19. This economic benefit, when it is supported by sound science in interpreting and conserving our heritage, contributes on the one hand to social and educational objectives, and on the other to the conservation of our environment—principally cultural rather than natural, but including historically important gardens and landscapes—for future generations. The component that, arguably, is missing at present from the sector, and which therefore threatens the twin social and environmental objectives of sustainability, is “good governance”—and this report contains recommendations designed to rectify that crucial omission.
- 2.20. The demands of equal public access and cultural tourism themselves present significant challenges to the preservation of heritage sites—the more visitors, the more wear and tear, including erosion of floors and walls, the greater the relative humidity and temperature changes, the more dust, and so on. In other words, while decay is intrinsic to any materials, including those materials of which cultural artefacts are composed, the economic and social uses to which cultural artefacts are put constitute an additional threat to their survival. This places an even greater onus on heritage science both to assess risk and to develop, where appropriate, remedial treatments.
- 2.21. Heritage science is thus key to the long-term sustainability of our cultural heritage: it is about managing change and risk and maximising social, cultural and economic benefit not just today, but in such a way that we can pass on to future generations that which we have inherited. In the words of Icon again, artefacts are conserved “for the enlightenment and pleasure of present and future generations”. (p. 166)
- 2.22. In focusing on the contribution that science can make to cultural heritage, we should not overlook the enormous potential benefit to science itself. Science is sometimes perceived as a threat, rather than a benefit, to society: heritage science presents an opportunity to demonstrate unequivocally the contribution that science makes to the cultural and economic well-being of society. It is also an aspect of science that is readily grasped and enjoyed—there is considerable evidence to show that the public relish the chance to witness and engage first hand with the techniques of conservation. If these benefits are to be maximised it is essential that the number of qualified physical and natural scientists coming into conservation is expanded.

⁷ Sources: *Monuments and historic buildings as value generators in post industrial economy*, Terje Nypan, Directorate for Cultural Heritage, Norway, 2004; *Construction research & innovation in the heritage sector: Foresight planning for a research strategy for the construction industry*, nCRISP Draft Report MK (May 2005), prepared by English Heritage; *Traditional Craft Skills: Assessing the Need Meeting the Challenge*, National Heritage Training Group (2005); Written Answer, HC Deb., 9 September 2003 (col. 336W). “Europe” covers all EU and EEA states.

Recommendation

- 2.23. **We recommend that the Department for Culture, Media and Sport review its departmental objectives in light of the Government’s policy on sustainability. We recommend in particular that the Department add to its objectives an explicit reference to the need to conserve our cultural heritage for the benefit of future as well as existing communities.**

CHAPTER 3: BACKGROUND

- 3.1. In this chapter we outline the factual background to the inquiry, beginning with the organisation of heritage sector and the research community that serves it, before turning to the size and funding of the sector.

Governance of the heritage sector

- 3.2. The heritage sector is highly decentralised. At governmental level responsibility for culture in England resides with the Department of Culture, Media and Sport (DCMS). DCMS is the smallest Whitehall department, employing just over 500 staff. Culture is a devolved responsibility in Scotland, Wales and Northern Ireland.
- 3.3. Within DCMS there is an “Art and Culture Directorate”, and this in turn is divided into a number of divisions, including the “Architecture and Historic Environment Division” and the “Museums and Cultural Property Division”. Thus the two aspects of our physical cultural heritage, the historic built environment (“immoveable heritage”), and the objects or specimens in museums, galleries and elsewhere (“moveable heritage”) are separated out administratively at a high level.
- 3.4. DCMS, through these divisions, sponsors a wide range of Non-Departmental Public Bodies (NDPBs). The largest is English Heritage (EH), which is responsible for the conservation of the historic environment, including the historic maritime environment, archaeology and landscapes in England. EH not only manages some 400 historic sites, but advises national, regional and local government on heritage and conservation issues. It has an annual budget of £165 million, and employs around 1,800 staff. EH has statutory functions with regard to the listing of buildings of historical or architectural importance, and regulating any alterations made to these buildings.
- 3.5. Although the written evidence from DCMS to this inquiry began with an assurance that it drew on input from English Heritage, it was notable that it in fact made almost no reference to the immoveable heritage; furthermore, the DCMS did not send any witnesses from the Architecture and Historic Environment Division to give oral evidence. In effect, the immoveable heritage appeared to be invisible at departmental level, so wholly had it been devolved to EH.
- 3.6. Through its Museums Division, DCMS also sponsors the National Museums and Galleries⁸ (NMGs). These are funded through Grant-in-Aid, governed by funding agreements which aim to identify priorities. However, the allocation of these funds and the setting of research priorities is in

⁸ There is no statutory definition of the “National Museums and Galleries”. However, the following institutions, which all receive direct funding via Grant-in-Aid from the Department for Culture, Media and Sport, and hold collections of national importance, are generally recognised as such: British Museum, Imperial War Museum, National Gallery, National Portrait Gallery, National Museums Liverpool, Natural History Museum, National Maritime Museum, National Museum of Science & Industry, Royal Armouries, Sir John Soane’s Museum, Tate Gallery, Victoria & Albert Museum, Wallace Collection. In addition, when we use the term in this report we include the National Museums in Scotland, Wales and Northern Ireland, for which responsibility is devolved. Finally, for the sake of brevity we also use the term to encompass institutions in the libraries and archives sector funded directly by central Government (the British Library and National Archives)—although these are not conventionally described as NMGs. All these institutions are represented at the National Museum Directors’ Conference.

practice largely devolved to individual institutions, though the National Museums Directors' Conference provides a level of co-ordination of common strategic issues. There are also informal exchanges between the heads of conservation in the NMGs, including those from the National Museums of Scotland, Wales and Northern Ireland.

- 3.7. Not all national heritage institutions fit into this model. The governance arrangements for the British Library, for instance, have recently been changed to allow a greater role, by means of a joint steering group, to the Department for Education and Skills in addition to DCMS. The National Archives, the repository of public records, are sponsored by the Department for Constitutional Affairs rather than DCMS. The Royal Botanic Gardens at Kew, a World Heritage Site, are sponsored by the Department for Environment, Food and Rural Affairs.
- 3.8. Regional museums are funded through local, not central, government. The Museums, Libraries and Archives Council (MLA), another NDPB funded by DCMS, administers the accreditation scheme for such museums in England (there are analogous bodies in the devolved administrations). However, the MLA, unlike English Heritage, has no statutory or regulatory function. Indeed, museum accreditation is voluntary—it was described to us as “not a prerequisite [for securing grants] but... certainly a key to ... be able to demonstrate that the institution has, for example, the right mechanisms of collection care and development in place”. (Q 269)
- 3.9. Finally, some of the most important guardians of our cultural heritage fall altogether outside governmental structures. The hugely important legacy of historic churches and cathedrals (Church of England churches represent almost half of Grade I listed buildings in England) receives no support direct from central Government. Instead churches rely largely on income generated from donations; grants from the joint English Heritage and Heritage Lottery Fund Repair Grants for Places of Worship Scheme meet only a quarter of the total amount spent on repairs.⁹ The repairs are carried out by skilled craftsmen employed in cathedral workshops, which maintain an apprenticeship tradition similar to that existing in Italy, which we saw first hand when viewing the repair of hard stone tables at the *Opificio delle Pietre Dure* in Florence.
- 3.10. Within the charitable sector the National Trust and Historic Royal Palaces are both self-financing. There are also innumerable private owners of cultural artefacts, both moveable and immovable, whose interests are in part represented by bodies such as the Historic Houses Association. Some private estates, such as Chatsworth, are accredited as museums by the MLA (see QQ 270–271).
- 3.11. As far as funding is concerned, the Heritage Lottery Fund (HLF) has been in recent years the major source of support for conservation in the United Kingdom. It has made grants to heritage projects (some of which involve conservation) totalling some £3.3 billion since 1995. However, it does not appear that HLF grants directly support heritage science; indeed, as Historic Royal Palaces noted, it “excludes research from its terms of reference”. There are also independent funders of heritage science or conservation.

⁹ See the evidence submitted to the House of Commons Culture, Media and Sport Select Committee in January 2006 by the Church Heritage Forum (<http://www.publications.parliament.uk/pa/cm200506/cmselect/cmcmds/912/912we34.htm>).

These include private foundations such as the Carnegie Trust, the Leverhulme Trust and the Mellon Foundation. (pp. 246, 251)

Distribution of heritage scientists

- 3.12. The availability of expertise in conservation and in heritage science within this complex and dispersed sector mirrors neither the governance arrangements nor the responsibility for caring for cultural artefacts. DCMS, the lead department, has in effect no capability in science or conservation. In the words of the Government memorandum, DCMS “believes it is more efficient for decisions on what conservation or IT skills and resources are required [to] be delegated to the experts in the bodies it sponsors and the wider cultural sector”. (p. 1)
- 3.13. In the absence of guidance from the Department, there are wide variations between NDPBs. English Heritage has a budget for all research (including conservation science) of some £9.8 million per annum, and has published a Research Strategy which aspires to be the focus of a national research strategy. In contrast, while the MLA at first sight appears to occupy a position with regard to the moveable heritage analogous to that occupied by English Heritage with regard to the immoveable heritage, it has no regulatory functions and far fewer resources—as Sarah Staniforth of the National Trust commented, it is simply “not established with the same level of staffing as English Heritage”. Nor does it have significant expertise or interest in conservation (in the words of its Chief Executive, Chris Batt, it is “not first and foremost a conservation agency”) or scientific research. (QQ 574, 263)
- 3.14. Most of the NMGs invest a proportion of their core funding in conservation and research, and in many cases they have world-class reputations in their fields. However, in the absence of leadership from the DCMS there is little consistency, and the sums involved are relatively small. More detail on the level of investment within the NMGs is given below in considering the size of the sector.
- 3.15. Of the independent charities, Historic Royal Palaces maintains a small laboratory at Hampton Court Palace, and has designed, won funding for, managed and implemented interdisciplinary scientific research projects. The National Trust, though out-sourcing most scientific work, makes a valuable contribution to projects, particularly in making sites available to research collaborators for examination and diagnostic monitoring.
- 3.16. We have already referred in Chapter 2 to the importance of university-based scientific research to conservation. The universities are also an important source of training for the heritage sector. However, the governance arrangements for universities are of course entirely separate from the heritage sector, and heritage-related science does not appear to be widely recognised within universities. Professor Norman H Tennent, Professor of Conservation Chemistry at the University of Amsterdam, told us that his chair “has no equivalent in the United Kingdom”. (Q 142)
- 3.17. Instead, university scientists carrying out heritage science research range across a number of physical and natural science disciplines and their applications, including archaeological science, building science, engineering and technology, computer science, conservation, environmental science, physics, chemistry, biology, engineering, environment, energy, design, spatial analysis, construction, geography and economics. Research results consist of

a patchwork of outputs that may overlap, challenge or complement each other.

- 3.18. University researchers are mainly dependent on time-limited external funding for heritage science research projects. Such projects are normally developed in collaboration with those who can make cultural artefacts and sites available for testing and monitoring; these include many of the bodies already mentioned, such as English Heritage, the National Trust, the NMGs, and so on. Projects are typically funded by means of competitive applications to the Research Councils (in the case of the immovable heritage, typically to the EPSRC). In addition, many major projects have been funded by the European Union Framework Programmes for Research¹⁰. But in all cases, funding is limited to individual projects—there is no ongoing, core funding for university-based research in heritage science.

The size of the sector

- 3.19. In assessing the strength of heritage science in the United Kingdom, it would seem reasonable to assess either the level of research funding, or the size and range of the research community, in order to ascertain whether it is growing or shrinking and whether there is a critical mass to maintain the skills base. However, it has not been possible to obtain a coherent picture of the size of the heritage science research sector using these indicators. Although our Call for Evidence specifically asked “is conservation research adequately funded”, no precise figures emerged from the evidence. The Government, for example, conceded that “it is difficult to identify the total amount of funding that goes towards conservation science”. (p. 2)
- 3.20. In part this lack of data is a result of the multidisciplinary nature of heritage science, which makes it difficult to assess funding or research activity reliably. However, the fact remains that, in Professor Tennent’s words, “There has never been any thorough quantification of the UK conservation science effort in terms of researchers, teachers, topics of investigation, responsibilities, funding”. Furthermore, where data do exist they deal separately with the immovable and moveable heritage, making it difficult to compare or form a coherent overview of the sector. All the data given below should therefore be seen against this backdrop of uncertainty. (p. 66)

Immovable heritage

- 3.21. With regard to the immovable heritage, English Heritage referred to background work already undertaken by the Commission for Architecture and the Built Environment (CABE) for nCRISP.¹¹ This showed that the top 10 public research funders’ total spend, for all SET-based research in the built environment, but with “a heavy emphasis on construction-based research”, was around £675 million per annum (p. 117). Of this, only

¹⁰ Funding under Framework Programmes is allocated to specific themes. For instance, in the 5th FP (1999–2002) there was a theme entitled “City of Tomorrow and Cultural Heritage”, within which there was research targeted at “protection, preservation and rehabilitation of Europe’s cultural heritage”. There was no specific cultural heritage theme within the 6th FP (2002–2006), and negotiations on the identification of themes under the 7th FP (2007–2013) were in progress at the time of our inquiry.

¹¹ The New Construction Research and Innovation Strategy Panel.

around £53 million¹² per annum is destined for built environment themes, covering not just conservation but many other aspects of the built environment (for instance, energy efficiency). It thus appears that funding for research specifically into conservation with regard to the historic built environment is a much smaller figure.

- 3.22. English Heritage has itself taken the lead in developing a strategy for research into the historic environment, and we look forward to the implementation of this strategy and its opening out to a wide range of contributors.¹³ In addition, EH currently invests some £9.8 million per annum (six percent of its total budget) on all forms of research, though a considerable part of this goes to areas such as history and archaeology (p. 111). In oral evidence Sir Neil Cossons, EH's Chairman, estimated that within this total about £1.6 million per annum were devoted to conservation science. (Q 302)
- 3.23. The level of Research Council funding for research relevant to the historic built environment, funding which supports university-based research in the field, is difficult to quantify—no clear answers emerged from either the written or oral evidence provided by the Research Councils. The sums are significant, but the subject is multi-disciplinary, funding is dispersed across Councils, and no overall quantification of the level of support is available. Some support is provided “in-kind”, such as the £500,000 of support provided in 2005 by the Central Laboratory of the Research Councils, whose facilities are used in research projects, for instance for carbon dating. (p. 25)

Moveable heritage

- 3.24. It is still harder to ascertain the level of funding for research into the “moveable heritage”. Much of this work is undertaken within the conservation departments of the National Museums and Galleries, and within these institutions funding levels, and budgetary arrangements, vary widely.
- 3.25. At one extreme, the total cost of research and curation at the Natural History Museum in 2004–05, at £13 million, represented about a third of total expenditure,¹⁴ with over a quarter spent directly on the curation and conservation of collections.¹⁵ At the other extreme, Hazel Newey, Head of Conservation at the Science Museum, told us the Museum did not have its own conservation science section, outsourcing any scientific work—with a budget of just £10,000 for consultancy. Investment in the remaining NMGs appears to fall between these extremes. In the case of libraries and archives, total core funding in 2005/06 was estimated by the National Archives at £180,000. (QQ 501, 496–497, p. 94)
- 3.26. There is no direct budgetary provision for conservation science by regional and local museums, galleries, libraries and archives.

¹² Source: the Government Response to the Committee's Report on *Energy Efficiency*, published in *Renewable Energy: Practicalities and Energy Efficiency: Government Responses*, 3rd Report, Session 2005–06 (HL Paper 69), p. 49.

¹³ *Discovering the Past, Shaping the Future: Research Strategy 2005–2010* (2005)—see <http://www.english-heritage.org.uk/server/show/nav.8652>.

¹⁴ Source: Natural History Museum, *Annual Review 2004–05*.

¹⁵ The natural history collections at the NHM are themselves a vitally important scientific resource; also their conservation presents unique challenges. These factors together go some way to explaining the level of investment in conservation at the Museum.

- 3.27. However, core funding from internal NMG budgets represents only a small part of the whole. As Ms Helen Shenton, Head of Collection Care at the British Library, told us, “the overall resource which is being levered potentially in library and archive development is larger than the narrow investment within our institutions”. Indeed, a recent (unpublished) data gathering exercise commissioned by the majority of NMG heads of conservation estimated that total spending on research for the moveable heritage in the years 2000–09 was £9.4 million, of which 46 percent derived from the European Union’s 4th (1994–1998), 5th (1998–2002) and 6th (2002–2006) Framework Programmes for Research, and 31 percent from the Research Councils. Total RC support was estimated at £450,000 in 2005 (compared with a total RC budget for SET-based research of over £3 billion). (Q 199)
- 3.28. These are small sums, and they do not they appear to have reached all the areas where additional funding is needed. When we visited the National Gallery, a world leader in technical art history, we were struck by the shortage of up-to-date analytical equipment. Scanners were from seven to 13 years old. Infrared spectroscopy and gas or liquid chromatography were conducted on second-hand equipment acquired from sources such as Brunel University and Waitrose. This is the reality of the scientific infrastructure within the NMGs.

Trends in funding

- 3.29. The paragraphs above indicate the paucity of data on the funding of heritage science. However, they do not reveal the long-term direction of funding. Here the outlook is not promising. As Mr Neil MacGregor, Director of the British Museum, told us:
- “There is certainly a risk of research of all sorts being squeezed as budgets are squeezed. We have been told that for the next three years the best we can hope is flat resources, possibly a decline in real terms. For anybody having to manage a museum or a gallery budget research is obviously one of the areas you can most easily cut back on because the impact is not immediately visible.” (Q 338)
- 3.30. Mr MacGregor’s view contrasts with that of the Minister, David Lammy, who stated, “I have said that the budget that we have given to our national museums has increased, and it has.” We do not dispute this as an historical statement, but given the current Comprehensive Spending Review, we find Mr MacGregor’s comments a source of concern. If budgets are to be tightened across the board in the coming years, there is every likelihood that budgets for conservation and conservation science within the NMGs will be hard hit. (Q 449)
- 3.31. The main external funding sources—the Research Councils and the European Union Framework Programmes (FPs) for Research—are well known. We have already noted that almost half of research into the moveable heritage in the current decade has been funded from Europe. However, the level of funding for heritage-related research declined from £28 million in the 5th FP (1999–2002) to £7 million in the 6th FP (2002–2006). Indications are that the forthcoming 7th FP (2007–2013) will see an increase in funding towards the latter part of the Programme, but not to the levels seen in the 5th FP—as Lord Sainsbury of Turville, the Science Minister, told us, “certainly

there will be more money going in, but I doubt it will restore the position.” (Q 460)

- 3.32. Moreover, there are also indications that the bulk of the funding is now likely to go to the construction sector through the newly organised European Construction Technology Platform, which includes a focus area on cultural heritage. This could leave little or nothing for the moveable heritage sector. Given the reliance of this sector on FP funding in recent times, this would be a highly detrimental development.
- 3.33. As for the Research Councils, the establishment of the Arts and Humanities Research Council (AHRC) in 2005, and the new Council’s willingness to “champion” heritage research, are positive signals. These have been mirrored by the willingness of the NMGs to seek “analogue status” with the AHRC—in effect allowing them to host research projects on the same footing as university departments. However, we have already commented on the difficulty we have experienced in trying to put a figure on RC investment in the sector. The fact that funding is project-driven and short-term means that it is impossible to look to the future with complete confidence.

Numbers active in heritage science

- 3.34. Numbers of scientists within the NMGs vary widely. In the National Gallery, for example, which has an international reputation for the quality of its scientific work in the field of paintings, there are the equivalent of 6.6 full-time scientific posts. On the other hand, the British Library and National Archives, which since 2002 have successfully developed a strategic framework for conservation research within the libraries and archives sector, have done so while creating just one and two posts respectively.
- 3.35. The numbers overall are small—the Institute of Conservation Science, which represented the sector until its decision in June 2006 to merge with the Institute of Conservation (Icon), had just 70–80 members. Research Councils UK estimated that there were “around thirty UK scientists working in this field ... employed directly by museums and galleries”. Icon itself, which represents the conservation profession as a whole, has around 3,000 members, a large proportion of whom are private conservators. Thus the proportion of scientists within the wider conservation community is small. (p. 26)
- 3.36. It has not been possible to estimate the number of university-based researchers who engage wholly or partly in heritage science.

International comparisons

- 3.37. Various EU member states, notably The Netherlands, Sweden, Spain, France and Italy, have at times made national provision lasting from between 3 and 10 years to support heritage science. In the case of The Netherlands, a 1988 report from the Court of Audit on the condition of that country’s state museums revealed a huge backlog in conservation. The Dutch government responded by launching in 1991 the Delta Plan for cultural preservation, a centrally funded programme running until 2000, and in the process established The Netherlands as a world centre of conservation and, through its National Conservation Centre, of heritage science. There seems little prospect that the United Kingdom will follow the example of the Dutch Delta Plan, however admirable, not least because the process of conducting a

national audit of conservation needs would certainly demonstrate the need for major public investment. In the case of The Netherlands, this was estimated in 1989 as some one billion guilders (almost €500 million at 2006 exchange rates for legacy currencies).

- 3.38. Comparison with Italy, which we visited in May 2006, is also relevant. In Italy scientific research is co-ordinated by the National Research Council¹⁶, which is funded by the Ministry for Universities and Research, and runs 100 research institutions located across the country, each specialising in different areas of science, technology and engineering. In addition, the Ministry for Cultural Heritage funds three central restoration institutes in Rome, Florence and Turin.
- 3.39. Our discussions in Italy revealed that the Ministry for Cultural Heritage saw the role of National Research Council institutes to be “pure” research. This institutionalised separation of “science” from “heritage” echoes the position we have encountered in the United Kingdom. But in marked contrast, the Italian National Research Council perceived basic and applied research to be inextricably intertwined. Not only has the National Research Council run major projects on cultural heritage (see Box 1), but it works on a regular basis with universities and heritage organisations at a local level on applied research on all types of moveable and immovable heritage. A good example of this was the programme of diagnostic monitoring *in situ* of the Florence Baptistery’s gilt bronze doors by Ghiberti and Pisano.
- 3.40. Furthermore, the commitment to scientific understanding as the basis for all conservation interventions was evident in our meetings with private sector conservators and local authority museums. The cleaning of Bernini’s marble sculpture of Pope Urbanus VIII in the Capitoline Museum in Rome was carried out by a small private conservation company, which undertook an extensive scientific diagnostic examination of the surface of sculpture before deciding on the cleaning regime. The private conservator concerned told us that he kept up with the latest scientific techniques by taking continuing professional development courses during the summer vacation.
- 3.41. The United Kingdom and Italy have had comparable rates of success historically in winning funding for collaborative scientific research projects from the European Framework Programmes for Research. Such successes, along with the long-established expertise within the NMGs, have helped ensure that United Kingdom heritage science is well regarded internationally.

¹⁶ The National Research Council, as well as providing funding, directly administers its 100 research centres on behalf of central government. It is thus very different from the Research Councils in the United Kingdom, whose function is to provide funding for research projects on the basis of competitive applications from researchers.

BOX 1**Italian National Research Council and Cultural Heritage**

From 1998–2002, the National Research Council ran a 4-year ‘Special Project’ on Cultural Heritage during which £27 million were invested nationally in scientific research for cultural heritage. Around 350 research groups from all over Italy took part including universities, public research institutions and SMEs.

The project was divided into 5 focus areas, namely:

- Ancient Resources: Knowledge and Dating
- Artistic and Architectural Heritage: Analysis, Diagnosis and Restoration
- Paper Heritage: Analysis, Diagnosis and Restoration
- Biological Archives
- Museums: Project Management and Benefits

The outputs from the project over 4 years included: 59 pieces of scientific equipment, 197 new technologies, 107 databases, 33 patents, 88 CD Roms, 4 DVDs, 13 videos, 50 websites, 63 pieces of software, 340 papers, 270 manuals/monographs, 75 cartographies, 34 catalogues and 41 new chemicals.

There is still a wide international readership for publications such as *Studies in Conservation* and the *English Heritage Research Transactions*. Mr Lammy went so far as to assert that “You will not find anyone in the country who ... will not say that conservation is in a good place and we still remain world leaders.” However, in the absence of ongoing support for heritage research such as that given by the Italian National Research Council, we are unable fully to share his confidence. (Q 434)

Other aspects of policy relevant to heritage science

3.42. As the evidence from University College London showed, the threats to our cultural heritage—from sources as diverse as natural or man-made disasters, pollution, water abstraction and planning—are the responsibility not only of DCMS as the principal sponsor of the heritage sector, but also of a wide range of departments and agencies. A summary is given below:

- The Department for Communities and Local Government (DCLG) and Defra both have responsibility for regulation and policy relating to energy efficiency and the reduction of CO₂ emissions. Older buildings are generally the least energy efficient, so in order to achieve long-term emissions targets it will be essential that historic buildings improve their efficiency. We have touched on these challenges in our report on *Energy Efficiency*.
- DCLG, the Department of Transport and the Department for Environment, Food and Rural Affairs (Defra) share responsibility for the impact of aggregates extraction on terrestrial, marine and coastal sites. Gravel extraction may lead to large scale excavation of cultural and archaeological landscapes. Damaging effects can be mitigated in advance through careful planning, but indirect effects, such as the long-term

impact of coast erosion, are far less easy to forecast and mitigate and are rarely discussed.

- DCLG and the Department of Trade and Industry (DTI) are responsible for policy in relation to construction impacts. Construction impacts on above-ground cultural heritage are easier to model than the very complex physical, chemical and biological variables in any buried archaeological site.
- Defra and the Environment Agency are responsible for pollution mitigation. While the negative influences of some pollutants on the durability of many materials is known, there is no long-term programme to map the damage to heritage materials. Deposits of pollutants as a result of events such as the recent destruction of the oil distribution terminal in Hemel Hempstead also endanger heritage sites.
- Agricultural and soils policies also have major implications for the long-term preservation of cultural heritage. For instance, peat extraction has had a major deleterious effect on archaeologically rich wetlands. This too is the responsibility of Defra.
- The Environment Agency is responsible for preventive action and response to natural disasters. Virtually all our cultural heritage is vulnerable to natural disaster and increasingly to phenomena associated with climate change.
- The Environment Agency also grants water abstraction licences. Although changes in groundwater levels can have serious implications for the structural integrity of buildings and tunnels, licences are granted without reference to cultural heritage impacts.
- English Heritage is sponsored by DCLG and Defra, as well as DCMS, and provides advice across Government on issues affecting the historic environment (for instance, changes to Building Regulations). It has statutory responsibility for listing historic buildings and advising on planning issues affecting the historic environment.

3.43. To a very modest extent the fact that EH is both sponsored by and advises not only DCMS, but DCLG and Defra, reflects the diversity of the threats to the built environment. However, the Government's evidence to this inquiry, submitted by DCMS, made no reference to the co-ordination or communication of heritage science research across Government, and there do not appear to be structures in place to ensure that adequate dialogue between the other parts of the heritage sector and the various interested departments and agencies takes place. This is deeply alarming.

The outlook for heritage science

3.44. Across central Government the heritage sector appears to be largely invisible, but underneath the fault lines run deep. The traditional division between moveable and immovable heritage is perpetuated in the organisation of DCMS. The fault lines are reflected too in the failure of the Government's evidence to this inquiry to take account either of cross-departmental issues or of the immovable heritage. Then there is the gap in governance, sources of funding and research priorities between the universities and the major heritage institutions, and the lack of a clear commitment on either side of the gap to bridge it.

3.45. Such divisions would make it difficult for any sector to be effective and influential. Moreover, the skills base in the heritage sector is small and needs to be strengthened. Research funding is precarious and largely project-based. Budgets within the National Museums and Galleries are likely to be squeezed along with those of other public sector institutions. In the words of Research Councils UK, “competing pressures are increasingly constraining museum-based scientists from undertaking long-term research projects”. When to this is added the uncertainty over funding, particularly the apparent shift in emphasis in the EU Framework Programme, the outlook for heritage science is bleak. (p. 26)

Conclusion

3.46. **Under the current governance and funding structure the maintenance of the science base for conservation, and thus the long-term preservation of the United Kingdom’s cultural heritage, are severely under threat. The Department for Culture, Media and Sport has hitherto failed to grasp the scale of this threat—indeed, probably does not know it exists. This must be put right.**

CHAPTER 4: HERITAGE SCIENCE: A COLLABORATIVE ENTERPRISE

The need for collaboration

- 4.1. As we have already noted, heritage science is not a single discipline—it draws on disciplines from across the physical and natural sciences. It is clearly not feasible for all these disciplines to be represented either within museum and gallery conservation science departments or within organisations such as the National Trust, Historic Royal Palaces and English Heritage, that represent the historic environment as a whole, including collections, buildings and sites. Input from university science departments is essential. But the flow of information and resources goes in both directions. Heritage science is applied, and much of the work addresses practical problems affecting specific artefacts, classes of artefact, or the materials used in these artefacts. If university-based scientists are to be involved they need access to collections, buildings and sites.
- 4.2. In addition, most problems in heritage science—for instance, the challenges of environmental degradation—cross national boundaries. It makes sense to call on expertise wherever it is available, and much work, especially EU-funded projects, relies increasingly on international collaboration.
- 4.3. Thus heritage science is by its nature collaborative. The development of collaborative projects requires good communication between organisations and individuals, to identify problems and research opportunities and to pull together the teams to work on them. To illustrate the point, in Box 2 we describe a successful collaborative project funded by the Leverhulme Trust. However, there is no uniformity, and Ms Sarah Staniforth, Conservation Director of the National Trust, described the process as largely “serendipitous”. Most collaborative projects were put together informally, “through networking at conferences, both national and international”. (Q 559)

BOX 2**The Dust Project**

The accretion of dust to cultural materials is the cause of irreversible soiling and damage to indoor artefacts; this damage can be made worse by unnecessary cleaning for presentation to the public. The science and management of dust was the subject of a major collaborative research project involving the University of East Anglia, the National Trust, English Heritage and Historic Royal Palaces, lasting from May 2002 to October 2005 and funded with a Leverhulme Trust grant of £88,000.

Field sampling, surveys and measurements took place at many historic buildings including 13 National Trust properties, five English Heritage properties, three Historic Royal Palaces properties and one National Trust of Scotland property. Laboratory work was undertaken at UEA.

The research included:

- sample collection of loose and cemented dust;
- analysis of dust using optical and scanning electron microscopy, and micro Raman spectroscopy;
- analysis of dust chemistry and modelling using a thermodynamic model;
- laboratory experiments at a range of humidity to explore the extent and speed of cement formation between dust particles and organic (cotton, silk) and inorganic (glass, metal, polymer) fibres.

Information on visitors' perception of dust was obtained through face-to-face interviews, and ways to manage dust were explored in focus groups involving heritage managers, curators, conservators and room stewards with direct experience of interaction with the public.

Dissemination was by means of a heritage end-users seminar titled "Dust to Dust", along with numerous conference presentations, publications and training sessions. Spin-offs included a rapid automated dust monitor (which has been patented) and a basic monitoring kit now in use on 100 historic properties.

Significant research outputs included a number of peer-reviewed papers and presentations. One of the key findings of the project was that dust adheres to, rather than sits on, objects, and that high humidity gives it a cement-like effect. It follows that objects should not be cleaned during or after periods of high humidity. Thus cleaning routines should vary around the country in order to avoid periods of high humidity—for example, cleaning should not necessarily take place before a historic house closes for the winter, if this coincides with high humidity levels. It may be better to leave the cleaning to just before the house re-opens in the spring.

- 4.4. In the remainder of this chapter we discuss both the barriers to collaboration, and the opportunities it presents to the heritage sector.

Different perspectives on research

- 4.5. The different priorities of university-based and museum-based scientists are a key barrier to establishing a good understanding between the sectors and

thus to developing effective collaboration. From the museum perspective, Dr David Saunders, Head of Conservation, Documentation and Research at the British Museum, argued that university research agendas “are often driven by their own needs and those of the research assessment exercises, to which they have to subject themselves”, rather than by the needs of collections or museums. The National Archives suggested that “often the University’s research agenda is entirely toward pure science, necessary and vital to their meeting some academic requirements while the cultural heritage sector needs applied science to find practical solutions to problems; this is sometimes viewed as soft science”. (Q 355, p. 93)

- 4.6. From the university perspective, the museums may sometimes appear to be over-preoccupied with solving practical collections-based problems, and thus unconcerned with more ambitious, longer term research or with outputs in the form of published papers. In the words of Professor Malcolm Grant, Provost and President of University College London, “their preoccupation is with their own collections. It is really quite inward-looking”. Professor Mark Pollard, of Oxford University, focused on the problem of a “filter-feeder community which is taking what resource it can as it goes past. It is very difficult to have long-term plans on that basis and therefore it is very difficult to enter into co-ordinated partnerships.” Professor Peter Brimblecombe went further: “sometimes it seems that output is not emerging”; as a result, “it is almost not recognised as a science”. (QQ 91, 145, 147)
- 4.7. The availability of resources tends to exaggerate such differences of perception. Core funding within the NMGs is always going to be stretched. Once museum-based scientists have solved one collections-driven problem, they are likely to face considerable pressure to move onto the next one. There is often little institutional encouragement to write up and publish findings other than in exhibition catalogues. Nor do the museums possess the infrastructure to support competitive applications for research funding, or to deal with the significant bureaucratic and administrative burden of major collaborative projects. The difference with the university sector, where such infrastructure is built into the system, is stark. As Professor Tennent put it:
- “For funding applications, what do the university staff do? They are recognised in their work, they apply for grants for research; that is part and parcel of the university research. What do museum workers do? They do not actually have the latitude in the same way to build in a month of work applying for a research grant from Europe. It is not in the framework of museum scientists who are at the coal face solving problems day in day out.” (Q 153)

End-user led research

- 4.8. The consensus among our witnesses was that collaborative “end-user led” research should be the goal. In the words of the Institute of Conservation Science (ICS), “the most successful university research ... is influenced by ... collections-based priorities”. Similarly, the National Trust said that end-user led research “should become the norm”. Similar pressures are coming from universities—it is a growing requirement of Research Council funding that they should work in partnership with “end-users”. Dr Eric May, of the University of Portsmouth, drew attention specifically to the value of the RC-

sponsored programme of Knowledge Transfer Partnerships¹⁷ in building up relationships between researchers and SMEs, and suggested this model might be developed in the heritage sector. (pp. 178, 28, Q 146)

- 4.9. What does “end-user led” research mean in practice? In the case of the National Trust, which has no in-house scientific capability, the ideal scenario would be that the Trust would be part of the research team, directing the work of the scientists involved towards specific problems relating to the sustainability of its properties and their contents. This would not preclude longer-term research designed, for instance, to collect evidence on generic conservation problems affecting the sector—for instance, the Dust project described in Box 2, in which the Trust was a major player. This model of end-user led research seems to us to be the right way to take the sector forward.
- 4.10. Within museums and galleries the relationship between in-house scientists, conservators and curators is so close that the concept of an “end-user” hardly applies. The challenge is to facilitate the development of similarly close, collaborative projects bringing together a much wider range of participants: on one side end-users, some without research capability, such as the National Trust, others, such as English Heritage or the NMGs, with in-house scientists, and on the other side university-based scientists, whose research, while it may appear peripheral to immediate collections needs, may in the context of end-user led, collaborative projects, make an essential contribution to the development of new and innovative conservation techniques and tools.
- 4.11. Experience suggests that putting together collaborative teams is essential to securing funding, and that once funding is secured, this will in turn attract new researchers—as Professor Pollard said, “you need to inject funding and able people will follow the funding” (Q 144). A good example of such collaborative work is that undertaken by the British Library and the National Archives since 2002 in developing a “joined-up strategy” for research in the area of libraries and archives. This is described in Box 3.

¹⁷ See <http://www.ktponline.org.uk/>.

BOX 3

A Research Strategy for Libraries and Archives

Before 2002 both the British Library and National Archives focused on what the BL called “specific conservation science to address the needs of its collection”. However, from 2002 both institutions began to work to identify research priorities applicable to libraries and archives in the United Kingdom and internationally. In 2003–04 both institutions appointed Heads of Conservation Research. In 2004 they each published conservation research strategies.

Although the level of direct investment by the British Library and National Archives themselves has been modest, it succeeded in bringing together a critical mass of interested bodies at an international round-table meeting in September 2004. This led to agreement on a national research strategy, involving all the United Kingdom’s copyright libraries, and in turn attracted funding of \$700,000 (two and a half times the total initial investment in research made by the BL and NA) from the Andrew W Mellon Foundation for two major research projects. With this funding in place, they have contracted university-based scientists to undertake the actual analytical work. (pp. 87-88, 93)

- 4.12. Thus an “emphasis on applied conservation research”, along with a “collaborative, outward-looking approach”, has borne fruit. The British Library concluded that “this model from the libraries and archives sector, whereby large institutions take the lead in thematic areas with the objective of networking, is appropriate for encouraging national and international collaboration across other sectors”. We agree. (p. 88)

Identification of priorities

- 4.13. The collaboration between the British Library and the National Archives demonstrates not only the advantages of establishing a critical mass, but also the need to identify priorities for research. In the words of Professor Randal Richards, of the Engineering and Physical Sciences Research Council (EPSRC), “One way to get research in this area going is if somebody has identified national priorities and you can then put together a consortium of scientists, arts and humanities experts and archaeologists.” Such priorities must, on the one hand, be firmly grounded in the practical experience across the sector of managing collections, buildings and sites, but, on the other, be generic and not narrowly specific. A key question, if research is to be galvanised in other sectors, is whether they too can succeed in identifying such priorities. (Q 69)
- 4.14. Overall the answer appears to be no. Many of our witnesses described the current situation in scathing terms. According to Historic Royal Palaces, “there is no national agreement about research priorities or data set archiving, strategic sharing of resources and expertise, provision of guidance on funding, etc. Thus research resources are diluted, efforts might be duplicated, opportunities for collaboration missed, and key research priorities misdirected.” (p. 250)
- 4.15. A similar point was made by University College London: “There is currently no body in the UK that has any strategic overview of needs and provision for conservation science including any mechanism for promoting and co-

ordinating collaboration among universities, museums, libraries, archives, historic buildings and other organisations.” (pp. 30–31)

- 4.16. At the same time, progress is being made, at least in the area of immovable heritage. On 29 March 2006, following the launch of its Research Strategy late in 2005, English Heritage and four of the Research Councils co-sponsored a workshop in Birmingham entitled “Preserving our Past”, with a view to identifying priorities for research in the historic environment.¹⁸ Five cross-cutting themes were identified: integrated methodologies; values; engagement and interpretation; impact of climate change on the historic environment; and sustainability. John Fidler, of English Heritage, hailed the event as “very successful ... a very exciting, dynamic occasion”, and we are optimistic that this initiative, by bringing together representatives of the heritage sector, universities and funding bodies, will help to develop the critical mass necessary to galvanise this aspect of heritage science. (Q 297)
- 4.17. However, there is no sign of comparable progress in the area of moveable heritage. There is of course no one body within that sector which can be compared to English Heritage, in terms of resources, research capability or regulatory authority. The consequences of this lack of leadership are obvious. We have already drawn attention to the lack of information on funding for research in this area; similarly, there does not appear to be any agreement, or indeed any movement towards reaching agreement, on the key priorities for research. We note that when we asked Professor Tony McEnery, of the Arts and Humanities Research Council (AHRC), who should champion research across the heritage sector, he identified English Heritage and, within the moveable heritage sector, the British Library, as key contacts. He made no reference to the broader museum sector. (Q 64)

Academic analogue status

- 4.18. The granting by the Research Councils of “academic analogue status” to the National Museums and Galleries was generally identified as a key step towards strengthening scientific research and developing more collaborative projects. Academic analogues are organisations outside the higher education sector that are entitled to apply directly for research funding. To be eligible to gain this status, such organisations must be UK-based not-for-profit organisations, and must be able to demonstrate a significant independent research capability. Without analogue status, such organisations can only participate in Research Council-funded projects as, in effect, end-user partners, making facilities and test sites available to others, but at their own cost.
- 4.19. The granting of academic analogue status should thus place those NMGs with significant research capacity on equal terms with the universities in applying for funding from the Research Councils. In May 2005, shortly after its establishment as a Research Council, the AHRC invited applications for academic analogue status from the heritage sector.¹⁹ Eight NMGs put in successful applications, but applications from others were unsuccessful.

¹⁸ For a note of the workshop, see <http://www.epsrc.ac.uk/ResearchFunding/Programmes/InfrastructureAndEnvironment/ReviewsAndConsultations/PreservingOurPastWorkshopReport.htm>.

¹⁹ See http://www.ahrc.ac.uk/apply/research/mandg/academic_analogues.asp.

Professor Tony McEnery assured us that the AHRC would be supporting these organisations in re-submitting their applications. (Q 90)

- 4.20. The benefits of academic analogue status over the long term are demonstrated by the success of the Natural History Museum, which holds academic analogue status with several Research Councils, in maintaining its position as the leading research centre in the world in the field of natural history conservation. As Professor Richard Lane, Director of Research, told us, the NHM has “just over £1 million worth of current grants” from the Natural Environment Research Council alone. In addition, as Research Councils UK pointed out, academic analogues can make free use of the analytical facilities run by the Council for the Central Laboratory of the Research Councils (CCLRC), allowing them to engage much more easily in “cutting edge materials science”. It is not surprising therefore that the NMGs were enthusiastic about the opportunities opening up to them. (Q 532, p. 25)
- 4.21. However, questions remain about the granting of academic analogue status. Professor Lane, for instance, noted that the AHRC had asked applicants to demonstrate that they supported “ten active research academics”. These 10 researchers were expected to have “significant experience of research at post-doctoral level in the arts and humanities”.²⁰ The result was that the NHM, despite its high expertise and reputation in science (which is reflected in the analogue status it enjoys with no fewer than six science-based Research Councils), responded to the AHRC’s invitation by deciding “not to apply”. (Q 532, p. 24)
- 4.22. In contrast, research in most of the other NMGs is strongest in the arts and humanities, and this has been reflected in the eight successful applications for AHRC analogue status. The danger is that while AHRC support will help these institutions to build on their existing areas of expertise, science-based institutions such as the NHM will not participate, and genuinely collaborative heritage science, spanning both arts and sciences, will be no further forward.
- 4.23. The AHRC was clear that it could help the heritage sector to gain access to the best science. Professor McEnery claimed that it would “work to bring together researchers in the arts and humanities with scientists”, and even asserted that “we engage in science”. On the other hand Dr David Saunders, of the British Museum (BM), when asked whether the AHRC could give analogues access to cutting edge science, replied, “I think we have doubts that it can”. (QQ 71–72, 377)
- 4.24. On the other hand, the BM does not need to rely solely on the AHRC—it already has analogue status with NERC, and is negotiating with EPSRC “to complete our hat-trick so that we can genuinely go across these boundaries in terms of finding funding for scientific projects based on questions that arise in the museum”. This surely is the way forward—for heritage institutions to seek analogue status not only with the AHRC, but with the science-based Research Councils, with a view to developing new synergies between the humanities and the sciences. However, few of the NMGs have yet gone down this path. (Q 377)

²⁰ *Ibid.* The qualification criteria are set out in the AHRC paper “Recognition of Academic Analogues” (May 2005).

- 4.25. We return in Chapter 6 to the broad question of Research Council funding, and the role of the AHRC in championing heritage science. At this point we welcome the AHRC's efforts to engage with the heritage sector, and the fact that it is encouraging museums and galleries to acquire academic analogue status. However, it is essential that science-based Research Councils, notwithstanding the establishment of the AHRC, should continue to engage actively with the heritage sector. We also note that the AHRC has hitherto focused on the NMGs, to the exclusion of organisations that care for the historic environment (many of which already have long-standing relationships with EPSRC). There is still a long way to go in developing a genuinely collaborative, multi-disciplinary approach to heritage science.
- 4.26. **We welcome the decision of the Arts and Humanities Research Council to invite applications from the National Museums and Galleries for academic analogue status. However, in order to promote collaboration with university based scientists we recommend that:**
- **All National Museums and Galleries seek academic analogue status with the appropriate science-based Research Councils, in addition to the AHRC;**
 - **That those Councils encourage and facilitate applications from the National Museums and Galleries in the same way that the AHRC has done.**

The skills base

- 4.27. Collaboration is essential to maintain the heritage science skills base. This applies both to the need to attract university-based scientists to the field by making sites and artefacts available for research, and to the conservation science profession itself, which needs to renew itself through recruiting physical and natural scientists from universities. This means focusing both on postgraduate research and on career development.
- 4.28. We have no doubt that able university-based scientists will engage with heritage science, as long as arrangements for identifying research gaps, putting together collaborative teams and securing funding are in place—we have already quoted Professor Pollard's remark that "able people will follow the funding". As Professor Brimblecombe noted, the four university researchers who gave oral evidence "all primarily did their PhDs not in conservation science but in straight science." (QQ 144, 140)
- 4.29. However, the problems facing the conservation science profession—those working in museums and galleries—are more acute. As Professor Tennent commented, "it is the core of the profession that is absent." There are currently no postgraduate courses in conservation science in the United Kingdom, which might draw students with first degrees in physical or natural sciences into the profession. In fact, when there was a recent European-wide initiative to launch a PhD programme in conservation science, no United Kingdom university participated. There are plausible reasons for this—Professor McEnery, for instance, argued that investment in such programmes was generally a "bad deal" for our universities. Professor Tennent, on the other hand, suggested that the United Kingdom had simply "missed the boat". (QQ 142, 98, 191)
- 4.30. More broadly, there was some scepticism about the value of conservation science courses in developing the necessary scientific skills.

Professor Brimblecombe, for instance, argued that European PhD courses in conservation science were “primarily driven from an art historical perspective, even though they are trying to be conservation science”. We do not feel able to comment on the content of such courses in European universities, but, in the absence of postgraduate courses in conservation science in this country, it is essential that other means be found to enable and encourage trained scientists to bring their analytical and research skills to bear in the heritage field. (Q 141)

- 4.31. This means that the NMGs need to collaborate with Research Councils and universities in offering facilities for students from university science departments to conduct research in the heritage field. There have been successes. Dr Leslie Carlyle, Head of Conservation at the Tate, drew attention to the museum’s long tradition of “having our conservation scientists trained through being registered at a university and being trained at Tate at the same time”. Tate had recently secured a grant from the Public Sector Research Exploitation (PSRE) Fund to support two PhD students, based at universities, but working at Tate. No fewer than six posts at the Conservation Centre at the National Museum of Liverpool are PSRE-funded. (Q 376)
- 4.32. However, such programmes are only the beginning. Beyond this, there have to be adequate career opportunities to attract and retain scientists within the heritage sector. At present there is no clear career structure. In Liverpool, for instance, in addition to the PSRE-funded posts (for which bids are required every two years), four further posts were funded by contract work, and only two posts (including the Head of Conservation) were permanent posts funded from grant in aid. While the staff show enormous enthusiasm and commitment, salaries are low, and in the absence of long-term job security and career development opportunities there must be a risk that their skills will ultimately be lost to the heritage sector. In the words of the Institute of Conservation Science, “The contract culture has further eroded prospects for developing individual careers in conservation science.” (p. 178)
- 4.33. This situation will not improve without significant investment in conservation and conservation science by the National Museums and Galleries. There is little sign of such investment: as the ICS continued, there is “serious loss” of younger conservation scientists, due to “low salaries ... and a lack of career structure”, particularly compared with mainstream careers in science and engineering. In a period of tight budgetary control reversing such losses will be difficult, unless these crucial areas are prioritised at the level of long-term strategic planning. This in turn requires DCMS, as the principal funding body for the NMGs, to set an example. We have already recommended that the Department include conservation within its strategic objectives. Unless it does so, there will be little incentive for the NMGs to prioritise conservation when they allocate their funds. The onus falls upon Government to show leadership, and we return to this issue and make recommendations in Chapter 8.

Research Assessment

- 4.34. The specific requirements of the Research Assessment Exercise (RAE) are frequently cited as a barrier to collaboration between university scientists and the museum-based conservation science community. Underlying this issue is a difference in emphasis in respect of the outputs of research. The British

Museum argued that the science undertaken in museums was “not always fully recognized by colleagues outside the immediate field”; in particular, the peer-reviewed journals that served the conservation community were “not recognised in research assessment exercises, perhaps because they place an emphasis on practical application of science to conservation practice”. (p. 148)

4.35. The Institute of Conservation Science (ICS) went further still:

“Most conservation science papers are now published in fully peer-reviewed journals and conference proceedings. We deplore the fact that very few of these are included in citation counts, *Studies in Conservation* being almost the only exception. This is a disincentive to university research partners to publish where their work will find the largest audience: the conservation profession. Journals eligible for the citation counts should be re-considered before RAE2008”. (p. 179)

4.36. From the university perspective, there was equally intense frustration that the results of research published in academic journals failed to register with the conservation community. In the words of Professor Brimblecombe, who was closely involved in the Dust project described in Box 2:

“I found that conservators and managers of heritage do not read scientific journals; in fact they hardly seem to read anything at all. The only way that I can really translate what I do into a policy change is by visiting them and almost shaking them and saying ‘Do you realise how vital it is? Dust inside historic properties does not come through the windows, it comes from your visitors. That means you have to change the way in which you route visitors through properties.’” (Q 182)

4.37. A middle way must be found if university and museum-based scientists are to work together effectively. We do not propose to make detailed recommendations regarding the RAE, given the uncertainties over its future beyond 2008. However, the effectiveness of research assessment depends on the maintenance of high standards in judging research outputs. The most effective way to improve the recognition of papers targeted in part at conservation professionals is therefore to build up an active, literate research community spanning universities and heritage organisations.

4.38. At the same time, we welcome what Icon described as “the recent shift within the RAE ... [regime] towards recognition of research in practice.” Heritage science is an applied science, and the development of new applications within the conservation community is fundamental. It is essential that the dissemination of the results of research to end-users, and the time spent by researchers in engaging with practitioners, be adequately recognised. We discuss dissemination further in the next chapter. (p. 169)

Conclusion

4.39. **Collaboration is crucial to heritage science. There needs to be good communication between university and museum-based scientists in order to draw effectively on the resources of both communities. But at the moment, despite isolated successes, collaboration remains largely *ad hoc*. There is no-one within the sector to promote information exchange and support the development of collaborative research projects. In particular, we deplore the fact that there is no body within the United Kingdom taking a strategic overview of research**

priorities across the field of heritage science. This must be addressed, and in Chapter 8 we make a number of recommendations designed to overcome these problems.

CHAPTER 5: DISSEMINATION

- 5.1. This chapter asks how the results of heritage science research are disseminated. First we consider the dissemination of new applications and best practice to the widely dispersed conservation community, the majority of whom work in the private sector. We then ask whether more could be done to inform the general public of the benefits to the heritage sector of the application of science, engineering and technology (SET).

The conservation community

- 5.2. Heritage science is applied science, and its ultimate success is best judged by the extent to which the research outputs and new techniques are put into practice by conservators. Although we have focused in much of this report on the conservation science undertaken in the National Museums and Galleries (NMGs), conservators are in reality a numerous and widely dispersed group. The Institute of Conservation (Icon) has around 3,000 members, of which some 400 are institutional members (Q 401). A large and growing majority of these members work in private practice, and the problems this presents in disseminating the results of research were summed up by Mr Alastair McCapra, Icon's Chief Executive:

“In the past there were larger conservation departments certainly inside national museums and therefore it was much easier to get the fruits of research out to the wider conservation community and the trend over the last 20 years towards outsourcing and having more conservators working in private practice has slowed that dissemination down. It does get out; I would not want to overstate this ... But it is a slower and patchier process of dissemination than it was in the past.” (Q 395)

- 5.3. Comparison may be made with the situation in Canada. The Canadian Conservation Institute, set up in 1972 to advance the practice, science and technology of conservation, provides a central source of advice on new techniques and best practice to museums and practitioners around Canada.²¹ As Dr Leslie Carlyle, of the Tate (but with 25 years' experience working in Canada), told us, this centralised model makes sense “in a country like Canada with a small population and a vast land mass”, but may not be directly applicable to the United Kingdom. Nevertheless, the comparison shows just how complicated the process of dissemination is in this country. We set out below the principal conduits of information for both moveable and immoveable heritage. (Q 366)

The written word

- 5.4. We have drawn attention in the previous chapter to the differences between university researchers and practising conservators and conservation scientists. Professor Brimblecombe (see above, paragraph 4.36) expressed his frustration that papers published by university researchers in peer-reviewed science journals were so little read by professionals within the heritage sector. The reason they are not read appears to be the perception within the profession that they focus on “pure” science problems, rather than on practical applications in the form of new techniques of conservation. Thus

²¹ See http://www.cci-icc.gc.ca/main_e.aspx.

the ICS confirmed Professor Brimblecombe's view that most conservators simply do not read science journals, suggesting that even conservation scientists, though they may read and contribute early in their careers, tend to lose touch with mainstream science:

"Conservation scientists do publish in the scientific literature ... but generally at the beginning of their careers. It has to be said that the mainstream scientific literature is rarely consulted by conservators and never by other museum professionals. Purely scientific papers would be perceived by most cultural heritage professionals as entirely lacking in context, and therefore of limited use." (p. 177)

- 5.5. Thus instead of writing "purely scientific papers" for an academic audience conservation scientists are more likely to contribute to the various specialist conservation or conservation science journals, including *Studies in Conservation*, *The Conservator*, and *The Paper Conservator*. However, we have had little evidence on the extent to which even these journals are read by conservators, still less by the other practitioners—architects, builders, and so on—who may be required to work on historic artefacts. This is the level at which the problems seem to occur. As Mr Ian Pritchett, of the Society for the Protection of Ancient Buildings, told us:

"I believe at the upper levels there is a reasonable exchange of information between academics and practitioners who have an academic interest, but below that level I think the transfer is fairly poor for the average layman working on historic buildings; there is very little dissemination of research information." (Q 107)

- 5.6. There are of course alternative sources of written information for conservators and other practitioners. The National Gallery publishes the highly regarded *National Gallery Technical Bulletin*, while the National Trust's recently published *Manual of Housekeeping* is a comprehensive source of advice on preventive conservation techniques for the moveable heritage. As Ms Katie Lithgow, of the National Trust, told us, the *Manual of Housekeeping* has sold of the order of 3,000 copies, and helps to "bridge both the professional and the lay audience". (Q 593)
- 5.7. In the sphere of the historic environment, English Heritage has since 1998 published a series of Research Transactions, based on case studies—for instance, an account of the management of historic roof spaces based on the dendrochronology of roof timbers at Lincoln Cathedral.²² These studies, embodying high quality research, and backed by Government funding, are undeniably authoritative. Less detailed, but equally relevant, are the technical pamphlets published by the Society for the Protection of Ancient Buildings.²³ More broadly, English Heritage monitors the condition of the built heritage through its Buildings at Risk Register, published annually, and an annual audit of the historic environment called the "Heritage count".
- 5.8. One notable absentee from this account of the range of publications available to practitioners is the Museums, Libraries and Archives Council (MLA). We asked Mr Peter Winsor, Collections Development Manager of the MLA, what responsibility the MLA had for providing advice to private owners of threatened heritage artefacts. In reply he said: "I think we can do very little

²² English Heritage Research Transactions, vol. 7, *Timber* (March 2001).

²³ See <http://www.spab.org.uk/bookshop/index.htm>.

directly for that except that we and a lot of other organisations have produced advice and guidance on the care and management of collections, and we have recently funded the Museum Documentation Association to create something called Collections Link which is putting a lot of this advice, guidance and information on to an on-line website.” (Q 274)

- 5.9. This Collections Link Advisory Service,²⁴ administered by the Museum Documentation Association (MDA), brings together a wide range of sources of information. These include brief guides, aimed at the general public, on managing different kinds of object, prepared by the Institute of Conservation (Icon). There are also links to the Standards for Collections Care series, published in the 1990s by the Museums and Galleries Commission. It is notable that the MLA, successor body to the Commission, appears to have no plans to update this series.

Other sources of information

- 5.10. The written word is not the only source of information on best practice. In the historic environment sector, the regulatory powers of English Heritage, and its responsibility for the listing of historic buildings, mean that it is uniquely well placed to disseminate best practice among developers, planners, architects, builders and craftsmen. EH is attempting to make use of this position to raise standards through accreditation—for instance, in the case of architecture, John Fidler told us: “I sit on the RIBA’s Conservation Committee and it has a remit to develop guidance and advice for the wider membership of the Institute ... we are working very hard now with the Institute to develop supporting education and training for the general membership of the Institute to drive those that think that there is a good market for their activities towards accreditation as specialists in conservation.” (Q 332)
- 5.11. There are also various voluntary or privately funded bodies assisting in disseminating best practice in the field of conservation of the historic environment. We have already drawn attention to the pamphlets published by the Society for the Protection of Ancient Buildings. Other bodies from whom we took evidence included the Building Limes Forum, which promotes understanding of the use of building limes in historic buildings, and the Institute of Historic Building Conservation, which represents a wide range of practitioners concerned with the conservation of the historic environment.
- 5.12. The learned societies and professional bodies also have a role—for example, Dr Robert McWilliam, of the Institution of Civil Engineers, noted that the Institution had been “instrumental in establishing a Consultation Accreditation Register for Engineers ... to identify British engineers skilled in the conservation of historic works and sites. It was established partly in response to a request by potential clients and partly to encourage excellence in what we regard increasingly important topic.” (Q 119)
- 5.13. However, none of these organisations is equipped to take overall responsibility for the dissemination of conservation skills. There are still important lacunae: Professor Jacques Heyman, formerly Chairman of the Cambridge University Engineering Faculty, who has for many years advised

²⁴ See <http://www.collectionslink.org.uk/>.

the Cathedral Architects' Association, noted that "it is very difficult to find engineers, and always has been, who are interested in working on these problems." There were just "three or four engineers in this country" to whom the Cathedral Architects' Association would turn for advice. Even with the active support of English Heritage, the picture in the historic environment sector is one of piecemeal endeavour, locally successful but not yet making a major difference nationally. (Q 561)

- 5.14. The position with regard to the moveable heritage seems to be still worse. The MLA, as we have already noted, has no statutory powers comparable to those of English Heritage. Although it provides accreditation for around 1,900 museums, building into the process minimum standards of collection management, such accreditation is voluntary. We saw little evidence, other than the development of the Collections Link website by the MDA, that the MLA used its influence to disseminate conservation guidance to practitioners in the field, including conservators in private practice.
- 5.15. In reality even within the museum accreditation process the MLA seems to have delegated responsibility for setting detailed standards largely to other bodies. When asked about the standards built into accreditation, Mr Peter Winsor, noted that "we insist that all conservation work is carried out by conservers accredited by the Institute of Conservation and listed on their Conservation Register." The Conservation Register was originally established and administered by the MLA's predecessor body, the Museums and Galleries Commission. (Q 263)
- 5.16. There is no doubt that the MLA could potentially, through the accreditation scheme, play an important role in disseminating best practice to museums across the country. In particular, there appears to be scope for the MLA, which now operates in partnership with its nine regional agencies, to use its network of contacts to disseminate best practice in conservation, within the context of accreditation, to the thousands of regional and local museums. It could thus play a role similar to that of the Canadian Conservation Institute, albeit less centralised. However, we saw no sign that the MLA was willing to take on such a role.
- 5.17. In the absence of a proactive approach to accreditation, the moveable heritage sector depends heavily on informal contacts, and conferences play a key role in facilitating networking, and the exchange of ideas and information on new techniques. As Icon pointed out in its written evidence, many conferences within the United Kingdom are now organised by Icon itself; internationally conferences are run "by the IIC ... and the [Committee for Conservation of the] International Council of Museums (ICOM-CC)". (p. 168)
- 5.18. Such events could in principle contribute to continuing professional development for conservation scientists and conservators. Ms Sarah Staniforth, of the National Trust, argued that university courses in conservation science might have a place in "mid-career training". Her colleague Katie Lithgow looked forward to the development of "a standard ... which involves the CPD to demonstrate that you have acquired the knowledge about conservation ethics as well as the professional standards that you have to maintain as a practising scientist to get accreditation." (QQ 584, 588)

- 5.19. We support the presumption that all conservation practitioners should undertake continuing professional development to maintain skills and knowledge of the latest applications of scientific research. At present, while Icon provides CPD for conservators in the field of moveable heritage, there does not appear to be an integrated structure for CPD across the heritage sector as a whole. This is a significant gap.
- 5.20. Finally, we turn to the commercialisation of new technologies: often the most effective way to disseminate the results of research is to develop a new product and market it effectively. Indeed, in the academic world commercialisation is being increasingly used as a measure of research achievement, alongside conventional measures such as publications. Professor Grant noted that the influence of initiatives such as Research Council-sponsored knowledge transfer fellowships, and successive rounds of the Higher Education Innovation Fund, was “starting to inculcate within universities a greater culture of reach out to the private sector, and also an understanding that some discovery is best advanced through commercialisation as opposed to publication and peer review journals.” (Q 88)
- 5.21. However, there are significant barriers to the extension of this model to the heritage sector. One of these is the potential conflict between commercial imperatives and those of the heritage sector, above all in the sphere of intellectual property. The British Library drew attention to two recent projects (a pH probe and a new approach to paper strengthening) which for practical reasons, including the cost of patents, did not result in marketable products. The Library noted the tension between the interests of the heritage sector as a whole and those of commercial partners, who in many cases “naturally want to protect their intellectual property rights”. (p. 90)
- 5.22. On the other hand, the importance of intellectual property was down-played by other witnesses, particularly those involved more directly in building conservation. Mr Ian Brocklebank, of the Institute of Historic Building Conservation, commented that in many cases intellectual property issues simply did not arise, as “there is actually a very limited commercial benefit, simply because the conservation field as it stands at the moment is actually quite small”. The solution was to expand the market for conservation techniques beyond their current narrow application to the “much broader field of, typically, grade 2 listed buildings, the vast majority of buildings in conservation areas and so on.” (QQ 111–112)
- 5.23. We agree: the key to developing commercial spin-offs from heritage science research is to expand the markets for new conservation tools or techniques. While this will always be difficult in some more specialised areas, such as paper or paintings conservation, it should be possible as far as buildings are concerned, given the size of the construction and engineering sectors. There are major difficulties to be overcome—we have already quoted Professor Heyman’s comments on the shortage of mainstream engineers interested in conservation of historic buildings. But unless the culture changes, we risk the future described by the Building Limes Forum: “an environment of beautifully-kept and presented monuments surrounded by a sea of partly-damaged context”. (p. 240)
- 5.24. In the previous chapter we considered the retention of qualified scientists in the conservation profession. The shortage of engineers interested in conservation highlights broader issues to do with the skills base, particularly

in the building and engineering professions, and the dissemination of best practice.

- 5.25. Various organisations exist to promote the use of appropriate materials and techniques on the historic built environment. For instance, the Building Limes Forum exists to promote the use of lime-based mortars and cements, which are “of critical importance for the preservation of ... the vast majority of buildings constructed before 1914.” Many of these buildings are not listed, and are unlikely to benefit from specialist conservation; however, the use of inappropriate cement-based mortars on restoration projects may inflict irreparable damage. The development of knowledge and skills across the construction industry is therefore essential. (p. 239)
- 5.26. Efforts are increasingly being made to overcome these risks. Mr Ian Brocklebank, of the Institute of Historic Building Conservation, drew attention to the inauguration of the National Heritage Training Group, which provides “a training route for craftsmen ... within the building trades”, so facilitating career development in what has hitherto been a field populated by enthusiasts. Mr Ian Pritchett, of the Society for the Protection of Ancient Buildings, agreed, noting that while he had seen periods of “great skills shortages”, the National Heritage Training Group had “made a big impact”. (QQ 131–132)
- 5.27. Sector Skills Councils are also working to overcome skills shortages. Although Mr Pritchett drew attention to some difficulties encountered in the introduction of the Construction Skills Certification Scheme, administered by CITB-Construction Skills, notably in the recognition afforded to City and Guilds qualifications, he accepted that this might be merely a “temporary imbalance”. In the longer term the certification scheme, along with the creation in 2004 of Creative and Cultural Skills, the Sector Skills Council for crafts and cultural heritage, should help to promote skills in these crucial areas. (Q 135)
- 5.28. Mr Pritchett struck one further warning note. He argued that skills would only be maintained if there was sufficient demand, but that the current procurement structure for building conservation works, based on competitive tendering, meant the contracts, sponsored by public money, went to “the lowest possible tenderer”. This was “counter-productive ... unless we actually recognise the quality of materials the quality of workmanship and those skills and are prepared to pay for them ... I think we will lose them again quite quickly.” In the long term, the availability of skilled builders and craftsmen depends on society’s willingness to pay for them. Once again, the development of stronger markets is the key. (Q 132)

Recommendation

- 5.29. **Despite the outstanding quality of individual publications, the dissemination of up-to-date results of heritage science to practitioners in the United Kingdom is patchy and poorly coordinated, particularly in the field of moveable heritage. We therefore recommend that the Museums, Libraries and Archives Council, in consultation with the National Museums and Galleries and Icon, review and consolidate the sources of scientific guidance available for collections-based conservators, with a view to providing a regular, central source of up-to-date advice.**

Promoting the role of SET

- 5.30. We turn next to a discrete issue raised in our Call for Evidence, the potential within the heritage sector to promote public understanding of science, engineering and technology (SET), and the use that the scientific community could make of conservation to make science more accessible to society. Public interest in history and heritage in general, and conservation in particular, is already strong, thanks in part to a number of high profile television series. In the words of Professor Mark Pollard, “The fascination with the visible and non-visible cultural heritage is obvious, and needs little promotion”, while the Culture Minister Mr David Lammy noted that, “there are more people saying, ‘We care about conservation.’” (p. 65, Q 450)
- 5.31. A wide range of “users” and “doers” of heritage science, from universities, learned societies and professional bodies, to NMGs and other heritage organisations, have successfully engaged the public with heritage science. Events have included exhibitions, displays, talks, laboratory visits and demonstrations. We saw some impressive examples in the course of our inquiry, including the Liverpool Conservation Centre, which we visited in June shortly before its reopening following refurbishment. Not only does the Conservation Centre include an exhibition which, in the words of the written evidence from the National Museums Liverpool, “demonstrates how scientific techniques are used to find out about and conserve our cultural heritage”, but it incorporates a laboratory in which scientists will go about their work in full public view, able to engage with members of the public. (p. 270)
- 5.32. While many activities have been the initiative of individual institutions, we have also been impressed by some notable examples of collaboration. Thus the National Gallery highlighted the use of technical case studies on its collection as the basis of a Royal Society of Chemistry teachers’ publication for secondary schools; of a series of Institute of Physics and Nuffield Science video films; and of the Salters A-level chemistry course. The National Museums of Scotland informed us that the challenge of conserving modern plastics had been used in a school text on conservation chemistry by the Royal Society of Chemistry. (pp. 267, 155)
- 5.33. Research Councils UK (RCUK) provided several examples demonstrating the value of heritage science to the scientific community. In the words of RCUK, “by demonstrating technological applications in cultural heritage, the science community reaches out to new audiences which may not normally be interested in science” (p. 28). Some examples of collaboration are worth listing:
- RCUK’s “Science and Society” programme works with museums in *Communicating Science through Novel Exhibitions and Exhibits*, focusing on how to design and deploy exhibits in science museums to enhance public engagement and participation.
 - The National Museum Cardiff hosted an exhibition on biodiversity organised jointly by the Natural Environment Research Council (NERC) and Biological and Biotechnology Research Council (BBSRC).
 - The Council for the Central Laboratory of the Research Councils (CCLRC)’s “Talking Science” lecture and public engagement programme has included elements on conservation science, such as the conservation of the Mary Rose, analysis of the Dead Sea scrolls, and the

science used to explore the hidden secrets of works of art at the Victoria and Albert Museum.

- The Economic and Social Research Council (ESRC) and Engineering and Physical Sciences Research Council (EPSRC)'s "People at the Centre of Communication and Information Technologies" programme has led to research on how people respond to new interactive and mixed media exhibits in museums and galleries.
- Arts and Humanities Research Council (AHRC) funding for the Mitchell and Kenyon film collection from the turn of the twentieth century led to a highly popular television programme, part of which focused on the conservation of the film archive.

- 5.34. Despite these achievements, Professor Pollard argued "that archaeology and cultural resource management is a vastly under-exploited tool for getting the public engaged in science", and that "the same is true of conservation science—not just for students, but of course for the general public". We are inclined to agree. Efforts to communicate SET to the wider public through the medium of the heritage sector, and the collaboration between heritage scientists and others who have a longer public reach, are patchy. In particular, ubiquitous new technologies such as web-based and mobile technology should be more systematically exploited to communicate heritage science to the public. (p. 65)
- 5.35. At present, there is no one body charged with promoting public engagement with SET through the innovative use of heritage science. Instead, projects appear to have been developed independently. The National Museums of Science and Industry, which might be expected to lead in developing the "hands-on" use of conservation science to promote public understanding of science generally, in fact conceded that such initiatives were "far more common in museums that deal with archaeology and art, rather than science and technology museums." (p. 208)
- 5.36. As well as promoting public engagement with SET, a single source of information on events, exhibitions and programmes on heritage science could also have the benefit of raising the profile of heritage science within relevant Government departments, principally DCMS and the Department for Education and Skills, and of encouraging public institutions to include heritage science routinely in their education outreach programmes. Icon has long recognised the importance of public engagement through its annual Conservation Awards, now in their eleventh year. In the words of Dr David Leigh, "every year we hope we can build onto that sufficient media interest that we do actually generate a [television] series out of it". Icon's interest and experience in this area makes it the natural body to lead in this area. (Q 410)
- 5.37. **We recommend that the Office of Science and Innovation undertake to provide the necessary resources to enable the Institute of Conservation to become the focus for the use of heritage science projects to promote public engagement with SET as a whole.**

CHAPTER 6: GOVERNANCE AND FUNDING

- 6.1. Chapter 3 gave a short factual overview of the governance of the heritage sector, its size, and the level and source of funding for heritage science. We concluded that the United Kingdom faced a long-term threat to the maintenance of the science base for conservation, and that the Government had hitherto failed to grasp the scale of this threat. In this chapter we explore these issues in more detail.

A champion for heritage science

- 6.2. There is currently no clear “champion” for heritage science and conservation within Whitehall. While this may seem academic, it can have important practical consequences. Take for instance the negotiations on the allocation of funds under the European Union 7th Framework Programme for Research. Lord Sainsbury of Turville told us that the task of negotiating the allocation of funds within the Framework Programmes fell to the Office of Science and Innovation, but “all government departments feed into those discussions”. However, when Neil MacGregor, Director of the British Museum, was asked how the United Kingdom could influence the allocation of funds he responded, “I have to say that it is quite difficult to know”. His colleague Dr David Saunders also referred to “the lack of influence at the crucial stages of deciding the framework”. Despite Lord Sainsbury’s words, the consensus within the sector is that DCMS has failed to argue effectively for EU funding to be allocated to heritage science and conservation research. (QQ 461, 361, 357)
- 6.3. The obvious place to locate a champion for heritage science and conservation would be DCMS. However, we drew attention in Chapter 2 to the fact that the Department makes no reference to conservation within its strategic objectives, while in Chapter 3 we noted that it has devolved responsibility for conservation largely to its NDPBs. The prospects of the Department taking a more active role in championing conservation and heritage science thus do not appear promising.
- 6.4. Indeed, Mr Lammy made the point that the lack of state control over the United Kingdom’s culture and heritage sector has deep historical roots. We fully acknowledge his point that “we do not want ministers deciding what we should see and hear and believe”—whether or not one accepts the Minister’s characterisation of what he called the “Continental model”. Culture in this country is not, has never been, and never should be, a manifestation of the state. (Q 422)
- 6.5. However, the fact remains that the Department for Culture, Media and Sport is the paymaster of many of England’s major cultural institutions and, for good or ill, exerts huge influence on the sector. The major NDPBs in the sector inevitably take their lead from strategic priorities and Public Service Agreements of the Department upon which they depend for funding. NMGs and heritage organisations, with a few notable exceptions, do not now appear to be giving strategic priority to conservation or heritage science—in most cases neither conservation nor science are represented at Board level. Indeed, the last ten years have seen a progressive downgrading of conservation and science within the institutional hierarchies of the NMGs.

- 6.6. One example is the Science Museum, where the Head of Conservation reports to the Head of Collections, who reports to the Deputy Head of the Science Museum, who then reports in turn to the Head of the Science Museum, who sits on the Board of what is now the National Museums of Science and Industry. As Hazel Newey, the Head of Conservation, confirmed, the Science Museum, having recruited a conservation scientist to support the conservation section when it was set up in 1993, now no longer has a conservation science section. (Q 490)
- 6.7. Still more striking is the lack of recognition accorded to conservation or heritage science by the Museums, Libraries and Archives Council. The MLA's five-year "vision" for the museum sector, entitled *Investing in Knowledge*, does not mention at any point the word "conservation". Although the MLA has launched a "Research and Evidence Strategy", there is no mention of either scientific research or conservation in the aims, objectives or proposed outcomes of the project.²⁵ Our exchange on this point with the Chief Executive, Mr Chris Batt, is worth quoting in full:
- Q307 Chairman:** In the web site that you have set up—and you have described the national evidence framework—you list seven themes.²⁶
- Mr Batt: Do we?
- Q308 Chairman:** Conservation or conservation research is not one of the themes that is mentioned.
- Mr Batt: You have the advantage over me because I cannot remember what the themes are, but I am sure there must be something there to do with collections.
- Q309 Chairman:** Yes, indeed there is. "Collections and services: data covering issue figures, documents produced, collection types, outreach and education."
- Mr Batt: Within that there will certainly be a strand of work which is associated with conservation and the read across I have talked about. We have a very broad tapestry of activity and we have to brigade it in ways that bring a number of things together, but I can assure you that that strand of conservation is important to us."
- 6.8. This is wholly unconvincing. For instance, Mr Alastair McCapra, Chief Executive of Icon, said: "If you look at, for example, the funding settlement from DCMS to MLA there is nothing in that about conservation science. In that settlement DCMS explicitly tells MLA what its priorities are to be and how much money is attached to each of those priorities and what the performance indicators are and what the timetable is. There is nothing in there about conservation science. Our gripe is that nothing is cascading down from the top." It is impossible to escape the conclusion that the Department's lack of interest in conservation has cascaded down to the MLA. It also appears to have cascaded down to some of the NMGs—there is every chance that it is also cascading from MLA down to the thousands of regional and local museums around the country. (Q 404)

²⁵ For more information see the MLA website, <http://www.mla.gov.uk/>.

²⁶ See [http://www.mla.gov.uk/webdav/harmonise?Page/@id=73&Document/@id=23466&Section\[@stateId_eq_1eft_hand_root\]/@id=4302](http://www.mla.gov.uk/webdav/harmonise?Page/@id=73&Document/@id=23466&Section[@stateId_eq_1eft_hand_root]/@id=4302).

- 6.9. At the National Museum level conservation and heritage science increasingly appear to be among the first areas to be cut back when budgets are tight. Neil MacGregor, Director of the British Museum, commented: “For anybody having to manage a museum or a gallery budget research is obviously one of the areas you can most easily cut back on because the impact is not immediately visible. I think there is a real danger to research in our institutions.” He concluded that “there should be a champion for research in museums and galleries.” We whole-heartedly agree. (Q 338)
- 6.10. This is not to say that, despite the lack of a champion, some major heritage institutions do not continue to place a high value on conservation. For example, Dr Michael Dixon, Director of the Natural History Museum, pointed out that the Museum’s “responsibility for the care of collections” was “enshrined in statute”. As a result, even though the funding agreement with DCMS focuses on delivery of the Department’s strategic priorities, the NHM retains considerable autonomy in pursuing conservation and scientific research—as Professor Richard Lane pointed out, “we tend to set our agenda and then get international peer review for checking out that agenda, and that is our normal *modus operandi*.” The role of science within the NHM is described more fully in Box 4. (QQ 502–503)

BOX 4

Science in the Natural History Museum

The Natural History Museum has a collection of over 70 million items from all over the world—and in the case of meteorites from other planets too. There are around 350 scientists working at the Museum across the disciplines of botany, zoology, entomology, palaeontology and mineralogy, of which approximately 100 are curatorial staff. The Museum has a substantial research enterprise using the collection to explore the diversity of the natural world and the evolutionary and other processes that generate such diversity.

Development of the collection is influenced by a research culture that permeates the organisation, including how curatorial work is carried out. The Museum’s collections are completely accessible to the research community. In addition to resident experts and students the collection was visited last year by 8,600 scientists. Access is being further widened by the innovative use of web-based technologies. The Museum’s research agenda is rigorously subjected to international peer review.

The vast majority of the collection is of living organisms which, when they die, begin to deteriorate rapidly. Hence conservation starts at the point of collection and follows through the preparation and storage of specimens. For most areas of the collection, conservation and curation are intimately connected. The Palaeontology Conservation Unit is the focus of conservation research in the Museum and reflects the earlier origins of natural history conservation in materials science. More recently, cross cutting research on integrated pest management and the extraction of DNA from specimens has given a great impetus to the field as natural history conservation becomes a discipline in its own right.

- 6.11. Sir Neil Cossons, Chairman of English Heritage, was still more forthright. He opened his evidence by declaring: “English Heritage is of course a conservation body and so conservation is at the heart of all that we do. To be an effective conservation body we need to have the quality of scientific

understanding of conservation well developed in the organisation. We see conservation as one of our central priorities.” English Heritage backs up this commitment by investing heavily (£9.8 million per annum) in research, of which £1.6 million goes to conservation research. But the fact remains that EH and the NHM continue to invest in conservation despite an almost complete lack of support from DCMS. Other institutions within the heritage sector are less well equipped to resist the influence of central Government. (Q 262)

- 6.12. If DCMS were to take responsibility for championing heritage science, how could they go about it? We have already drawn attention to the division within the Department between the Architecture and Historic Environment and Museums and Cultural Property Divisions. If, as we have argued, heritage science should be a broad-based, collaborative enterprise, any champion would have to span this divide. One way to achieve this is set out in the 2004 review of the Department by the then Office of Science and Technology (now the Office of Science and Innovation, and hereafter referred to as OSI).²⁷
- 6.13. The OSI review contains several useful recommendations. For example, Recommendation 2 was that “DCMS should work with and encourage stakeholders to establish science strategies”. Recommendation 3 was that to “fulfil its stewardship responsibilities” the Department should “assure itself that its main science-using NDPBs have science strategies in place that are based on and support the NDPBs’ objectives, responsibilities and priorities”.
- 6.14. OSI further concluded that DCMS had “no co-ordinated strategic approach ... to the use of science”. While DCMS had in-house expertise to enable it “to fulfil the role of an intelligent customer ... in the areas of social and economic research”, there was “generally no in-house expertise in other areas of science”. OSI was also “concerned at the lack of a Senior Civil Service-level scientist in the department who could bridge the interface between the science and policy worlds”. The review therefore recommended that the Department appoint “a senior part-time Chief Scientific Adviser ... This would be a respected scientist.”
- 6.15. We endorse all the conclusions and recommendations summarised above. In particular, a senior Chief Scientific Adviser (CSA), respected within the scientific community, could play a key role in championing conservation and heritage science at departmental level, and in ensuring that the importance of good science was adequately reflected across the board—in negotiations between DCMS and its NDPBs on funding, in departmental strategic objectives, in inter-departmental discussions in Whitehall, and so on.
- 6.16. OSI’s recommendation regarding a Chief Scientific Adviser was accepted by DCMS. Nevertheless, little or no progress towards actually making an appointment had been made by the time our inquiry was launched. Indeed, there appeared to be considerable confusion within Government as to when and how the recommendation would in fact be implemented. In our first meeting with officials, Mr David Roe of DCMS told us, “our current thinking is that the person we are looking for would likely be an eminent social scientist, albeit someone who had very strong credibility and strong networks with the wider scientific community.” However, a few weeks later,

²⁷ *Science Review of the Department for Culture, Media and Sport*, Office of Science and Technology (September 2004).

the Science Minister Lord Sainsbury told us that the Department was proceeding “on the basis that he should be someone who can look after the hard science as well as the social science ... It is probably more important that the person is from the hard sciences than the social sciences”. (QQ 47, 422, 427)

- 6.17. The uncertainty was if anything increased when our Chairman tabled three written questions in July, asking whether the terms of reference had been agreed, when the post would be advertised, and whether the appointee would have expertise primarily in social science or the physical and natural sciences. The DCMS merely stated that “the department intends shortly to make an interim, part-time appointment for a period of about six months. When appointed, the person will advise the DCMS board and help to finalise the terms of reference and the principal area of expertise for a longer-term appointment. These will then be published and the post advertised.”²⁸
- 6.18. The Committee was subsequently informed by letter that Mr Michael Dixon, Director of the Natural History Museum, and an eminent zoologist, had been appointed to this interim post. We welcome Mr Dixon’s belated appointment, and look forward to publication of the terms of reference for a permanent appointment in the near future. We shall keep this matter under review in the coming months.
- 6.19. The Department’s continuing uncertainty over the desired area of expertise for its CSA, and that person’s ultimate role, found echoes in the diverse views of our witnesses. Mr Alex Beard, of the Tate, thought the appointment of a social scientist as Chief Scientist would be “the most appropriate course of action”. Mr Neil MacGregor, of the British Museum, went still further, arguing that “it is important there be a champion for the funding of this activity which is separate from DCMS”. He argued that this role should be located within the Research Councils, “perhaps ideally in a joint venture by the AHRC and perhaps the EPSRC making it clear that it is a humanities and science joint venture”. (QQ 346, 344, 338)
- 6.20. The views of English Heritage, though couched in very moderate terms, were rather different. Mr John Fidler, while accepting that the decision was by no means straightforward, expressed the hope that if a social scientist were to be recruited, “then their disciplinary background [would] help us to interface with the department and other agencies”. The Chairman of EH, Sir Neil Cossons, went further, arguing that “if DCMS were to have a more important role in helping to co-ordinate conservation agencies in terms of their scientific work, then I think they do need a hard scientist.” (Q 287)
- 6.21. We therefore cannot agree with the views of the British Museum or Tate. The reinforcement of scientific expertise within DCMS, even the “championing” of heritage science, need not threaten the independence of heritage sector from state control. A comparison with the position Scotland is instructive. Dr Jim Tate, of National Museums of Scotland, noted that the Scottish Executive had issued “broad guidance” in its cultural policy statement, *Scotland’s Culture*.²⁹ He continued, “If I may quote, it says it will,

²⁸ HL Deb., 19 July 2006 (col. WA 184).

²⁹ January 2006—see <http://www.scotland.gov.uk/Publications/2006/01/18091052/0>. One of the three “key principles” underpinning this policy statement is to “promote the best of Scotland’s rich cultural treasure-store, maintaining and presenting, as openly and accessibly as possible, Scotland’s superb national galleries’, museums’ and library collections”.

‘allocate future resources to best achieve national priorities for the conservation of collections and improvement in public access to them’. They are giving a responsibility very clearly to the national collections to sort out the actual strategy which will deliver the best conservation.” (Q 337)

- 6.22. The Scottish Executive appears to be showing a proportionate level of commitment and leadership, while in no way detracting from the responsibility of heritage institutions to take the lead in developing conservation strategies. DCMS’s abnegation of responsibility for either science or conservation stands in stark contrast.
- 6.23. Our disagreement with the British Museum and the Tate is thus largely a matter of emphasis. While we believe that DCMS should “champion” heritage science, through a suitably qualified Chief Scientific Adviser, this is not to say that the Department should devise or impose a co-ordinated strategy upon its NDPBs. What is required is that the Department should be capable of offering intelligent support to its NDPBs, assisting them to identify areas of common scientific interest, and that it should possess the expertise in-house to act on their behalf in inter-departmental discussions. To do this the Department needs to make conservation a strategic priority, and to offer support and advice to its NDPBs where necessary through a suitably qualified Chief Scientific Adviser.
- 6.24. **We recommend that the DCMS move rapidly towards the appointment of a permanent Chief Scientific Adviser, as recommended in 2004 by the Office of Science and Technology.**
- 6.25. **DCMS does not currently possess the scientific expertise to act as an intelligent customer of science. This has prevented the Department from recognising the importance of heritage science to the preservation of our cultural heritage. It has also inhibited the Department from arguing effectively for the allocation of funds to the heritage sector from the European Union Framework Programmes for Research. We therefore recommend that the terms of reference for the new Chief Scientific Adviser make it clear that the appointee should have primary skills in the natural or physical sciences.**
- 6.26. **Once appointed, we recommend that the DCMS Chief Scientific Adviser act as a “champion” at departmental level for heritage science. This is an essential prerequisite if an understanding of the value of science is to cascade down to the heritage sector as a whole, and the downgrading of conservation and heritage science within the sector is to be reversed.**

The Research Councils

- 6.27. The question of which of the Research Councils should champion the funding of heritage science projects takes us back to the fundamental issue with which this report began—the relationship between science and the humanities. Professor McEnery was emphatic that “the AHRC is championing heritage within the research councils”. He also asserted that “we engage in science.” However, we have already noted that so far AHRC has focused rather narrowly on the NMGs, and on the moveable heritage. It has also invited applications for analogue status on the basis of excellence in humanities research, without reference to science. We therefore have some sympathy with the view expressed by Professor Grant, of University College

London: “In terms of excellence of science, it would be EPSRC we would favour as the lead”. (QQ 65, 72, 68)

- 6.28. However, we also note the contrary arguments put forward by Professor McEnery: “I would make a case for the AHRC on the grounds of (a) embedding conservation science within the broader question of heritage; and (b) also looking at the engagement of the different research councils with the heritage sector and seeing where the easiest fit was.” We note also that Professor Richards, of the EPSRC, endorsed this conclusion, and that Lord Sainsbury argued that the AHRC’s leadership role should be made still more explicit: “we should probably make it clear they are the lead research council on this”. (QQ 73, 465)
- 6.29. Given the recent creation of the AHRC, and the Science Minister’s support for its leadership among the Research Councils on heritage science, we therefore accept that it should be given the time to prove itself. Indeed, it would be helpful if the Office of Science and Innovation could formalise this role, as the Science Minister indicated. At the same time, the AHRC urgently needs to engage as widely as possible not only with the heritage sector, but with the scientific community that supports it, including the science-based Research Councils. We are not convinced that it has yet done so.
- 6.30. A key measure of the AHRC’s success will be the level of funding for heritage science. Science is expensive, and this is reflected in the relative budgets of the Research Councils: in 2005/06 some £81 million for the AHRC, rising to £97 million in 2007/08, compared with £568 million, rising to £721 million, for the EPSRC.³⁰ The AHRC will clearly have to develop a dedicated programme of heritage science research that draws on funding from the science-based Research Councils, as well as from its own budget, to support inter-disciplinary, collaborative projects. We were therefore extremely concerned to learn that following the “Preserving our Past” conference (see above, paragraph 4.16) NERC decided to withdraw support of some £30,000 to fund a programme to establish interdisciplinary research clusters. This is all the more worrying in that NERC represents UK science in negotiations on the environment theme within the EU Framework Programmes for Research, within which heritage science falls.
- 6.31. We have already commented on fact that the Research Councils were unable to provide us with reliable figures for how much they were in fact investing in heritage science. The written evidence from RCUK, after noting that “funding of conservation research in the UK is contributed to by several of the Research Councils”, went on to give various figures of debatable relevance. For instance, it told us that NERC is funding a £2 million programme of research on human evolution, “exploring the interface between the disciplines engaged in human evolution research”. It also told us that the AHRC makes grants totally around £4 million per annum to “archaeology research where the emphasis is on the understanding of past human life and culture”. (p. 25)
- 6.32. It is far from clear how much of this funding goes to what we in this Report have called “heritage science”—although undoubtedly some funding does support the development of tools and techniques of research. What is clear is

³⁰ Source: *Science Budget Allocations 2005–06 to 2007–08* (May 2005): <http://www.dti.gov.uk/science/science-funding/budget/page28923.html>.

that the Research Councils have hitherto made no effort to identify funding for heritage science. This will not be an easy task, given its multi-disciplinary nature, but in the absence of such basic information it will be impossible to ascertain how successfully the AHRC is fulfilling its role as “champion” of heritage science.

- 6.33. How will the AHRC’s role work in practice? Professor McEnery drew attention to the “need to interface with the science councils,” and gave an example how such interface would work: “somebody ... who wanted to do some cutting edge science within a largely arts and humanities-led piece of archaeological research would simply apply to the AHRC and we would do the negotiation at NERC regarding what proportion of the grant they would then fund.” (QQ 65, 67)
- 6.34. The assumption underlying this example is that funding will be provided in “responsive mode”. In Professor Randal Richards’ words, responsive mode is “where the research[er] can apply at any time for any subject with any opportunity”. It is project-driven, and although in some cases the sums are large, they are limited to one project at a time—there is no long-term security for the sector as a whole. There is no doubt that the responsive mode has been highly effective in promoting excellence in research; however, there is a question whether this approach is best suited to a small, applied, inter-disciplinary field such as heritage science. There was certainly a perception from some of our witnesses that, as Icon put it, “Bodies such as the research councils have tended to favour ‘pure’ research over ‘applied’ research”, and that heritage science has suffered accordingly. (Q 75, p. 169)
- 6.35. In addition, the process as described by Professor McEnery is inherently somewhat *ad hoc*—it relies very heavily on goodwill and effective day-to-day communication between individuals working within the relevant Research Councils. The process may be rather opaque to applicants for funding. As Professor Grant commented, “It is interesting how it has been described by my two colleagues in terms of informal relations between research councils, but I have to say that on the ground it often seems less of a network and more of a cobweb.” While we do not doubt the sincerity of those in the Research Councils currently trying to make the best of the system, it remains far from ideal in the context of heritage science. In particular, in the absence of an identified “champion” for conservation within AHRC and transparent links with other science-based research councils, we see little prospect that university scientists will be convinced of the AHRC’s ability to promote heritage science. (Q 67)
- 6.36. Responsive mode, whether at national or European level, also places a heavy bureaucratic burden on individual applicants, who have to allocate resources to discovering where funds can be accessed, and then to preparing detailed, competitive applications. In Professor Grant’s words: “we are wasting a lot of time with people having to cast around into obscure pockets to piece together a funding package.” While the major research universities have the necessary infrastructure in place, resources within the NMGs are already stretched. The National Archives, for instance, noted that few national institutions were in a position to lead on EU-funded projects, owing to the “accounting bureaucracy and financial responsibility now required”. It is highly unlikely that regional or local museums, funded through local authorities, will be able to put together collaborative teams able to compete for such funding. (Q 67, p. 94)

- 6.37. What are the alternatives to responsive mode funding? One option, explored in our inquiry, would be to “ring-fence” funds from across the Research Councils to support heritage science. Historic Royal Palaces argued that ring-fencing, by making funding more visible, would allow the sector to focus its resources on identifying research needs rather than on the search for funding sources: “A dedicated funding stream would mean that needs, rather than available funding, would determine research. This would greatly enhance the capability of the UK research community to respond proactively to the rising demands and potential for SET in cultural heritage.” (p. 251)
- 6.38. Ring-fencing need not be permanent. The case for time-limited ring-fencing for heritage science was put persuasively by Dr Clive Field, of the British Library:
- “To develop a sustainable national framework we do need some ring-fenced money for a period of time. I do not think we are particularly arguing for ring-fenced funding forever because obviously in the true spirit of the way in which research councils operate, good research proposals submitted in responsive mode will be funded, but for the moment ... to get agreement in terms of what the national priorities are and essentially to get that programme started, we believe that we do need a source of ring-fenced funding.” (Q 218)
- 6.39. However, even the idea of time-limited ring-fencing was rejected by the Research Councils and the Government. Professor McEnery argued that ring-fencing, say, £2 million a year for heritage science, might “serve as a cap” on funding—although given the precarious state of heritage science at present this appears a remote prospect. Lord Sainsbury argued that the sheer diversity of heritage science ruled out ring-fencing: “I think what is striking about the conservation work the research councils do is it is incredibly diverse ... It ranges from pest control in trees, to new material science which is used in the building environment through to the use of ISIS neutron sources on conservation. It does not make any sense to put all of that into one single budget.” On balance we agree with the Minister that the multi-disciplinary nature of heritage science means that it is not feasible to “ring-fence” Research Council support. (QQ 69, 466)
- 6.40. A middle way between responsive mode and ring-fencing would be for the Research Councils to instigate a time-limited directed programme of research in heritage science. This is an accepted approach where, as Professor Richards put it, there is prospect that “future research capacity in the UK would be compromised in strategic areas”. Indeed, the written evidence from RCUK drew attention to directed programmes as a tool to promote interdisciplinary research, noting for example that “NERC has ... fostered collaboration through a directed programme on urban regeneration (URGENT). One of the projects supported by this programme considered the effect of urban development on archaeological sites.” Another advantage of such a programme is that, while it concentrates on stated strategic objectives, research proposals outside these areas may still apply for funding via responsive mode applications to the relevant Research Councils. (Q 81, p. 27)
- 6.41. However, heritage science has yet to be identified by the Research Councils as an area in need of capacity building. This may in part be because of the extraordinary fragmentation of the sector, and the lack of any organisation able to identify research needs. As Professor Richards commented, “One way

to get research in this area going is if somebody has identified national priorities and you can then put together a consortium of scientists, arts and humanities experts and archaeologists to attack that particular problem.” In Chapter 8 we ask who should take responsibility for identifying these priorities within the heritage sector. (Q 69)

- 6.42. Finally, a further key issue, as far as university-based science is concerned, is the acceptance by the AHRC of the principle of full economic costs. As Professor Grant noted, the move in recent years to funding the full economic costs of research has been “tremendously important in a historically under-funded university science environment in the UK”. Professor Brimblecombe and Professor Pollard also both commented on the relative attractiveness to researchers of Research Council grants based on full economic costs, as opposed to private European funders. (QQ 68, 144, 152)

Recommendations

- 6.43. **We recommend that for the avoidance of doubt the Office of Science and Innovation should formally appoint the AHRC as the Research Council responsible for heritage science, and that at the same time it review the funding available to the AHRC from within the overall budget of the Research Councils so as to reflect the higher cost of scientific research. We further recommend that the OSI review the performance of the AHRC in this regard before the end of 2008.**
- 6.44. **As champion for heritage, one of the key tasks of the Arts and Humanities Research Council will be to deliver an increase in Research Council funding for heritage science. In the absence of reliable data, it is currently impossible to measure success or failure in this task. We therefore recommend that the AHRC commission an analysis of current levels of Research Council funding for heritage science, and that it publish the results and update them annually from now on.**
- 6.45. **We recommend that the AHRC take steps to ensure that its responsibility for scientific research in the field of cultural heritage is reflected in the appointment of an appropriate “champion” at Council level, supported by qualified staff.**
- 6.46. **We recommend that the AHRC, in conjunction with the other Research Councils and the heritage sector, bring forward proposals for a time-limited directed programme of research in heritage science, with the aim both of re-generating this area of research and of attracting younger scientists to enter it.**
- 6.47. **We recommend that AHRC and the Office of Science and Innovation make a formal commitment to recognise the full cost of science-based research in field of cultural heritage. This commitment should be reflected in the size of individual awards and in the AHRC’s acceptance of full economic costs.**

CHAPTER 7: INFORMATION AND COMMUNICATIONS TECHNOLOGIES AND THE HERITAGE SECTOR

- 7.1. The use of information and communications technologies (ICT) has been for the most part a discrete area within the inquiry. However, ICT increasingly overlaps with mainstream conservation, particularly given the volume of new material (for example, the ever-growing archive of BBC programmes) which is generated or routinely stored in electronic form. The major source of advice and expertise in this area is the Museum Documentation Association (MDA), a NDPB funded in England by the MLA, and in Scotland and Wales by analogous bodies, the Scottish Museums Council and Welsh Museums Federation.
- 7.2. Four overlapping issues relating to the use of ICT have been identified in our inquiry as being particularly relevant to the heritage sector:
- The documentation of collections;
 - The digitisation of collections, and the long-term management of these digital records;
 - Preservation of materials which are “born digital”;
 - Other areas of ICT applicable to heritage—particularly the increasing use of Internet, and of digital imaging and “virtual reality”.

Documentation

- 7.3. Clear and accessible documentation is fundamental to good collections management. Documentation, as defined by the MDA, is “the technical practice of cataloguing and information management in museums.” It serves internal and external functions: internally, it is essential for purposes of stock control and management; externally, it allows key information on collections to be made generally available—including on the many items that at any given time are not on public display. (p. 82)
- 7.4. ICT can be invaluable to both internal and external aspects of documentation. However, as with all new applications of ICT, there are risks as well as advantages. For instance, the MDA commented that while there had been “a significant increase in the amount of collections information available online”, this had “not necessarily been matched by improvements in its quality”. Merely increasing the volume of documentation and putting it online can be counter-productive unless the information is presented in a user-friendly fashion—for instance, it must be readily searchable so that key information on particular items is accessible with a minimum of difficulty.
- 7.5. At present there do not appear to be uniform standards of electronic documentation among the major heritage organisations. The MDA noted that “museums have tended to take responsibility for the creation of ‘home-grown’ services which meet specific organisational needs”. It further pointed out that museums “have not tended to engage with the commercial/private sector, particularly around the delivery of IT-based services ... A clear example is the sector’s drive to create its own ‘search engine’ for collections information rather than engaging with sector leaders such as Google or Yahoo.” In oral evidence, Mr Nick Poole, Director of the MDA, developed this point, noting that museums “operated in a project funded climate”,

producing “localised ways of bringing together information about museum collections”. (p. 84, Q 252)

- 7.6. On the other hand, “off the shelf” products will not necessarily provide all the functionality required by museums or other heritage organisations. What is needed is a constructive engagement between the heritage and private sectors, such as that described by Dr Clive Field of the British Library. The Library, while purchasing what was basically an off the shelf documentation system, in use in libraries across the world, developed that system in partnership with the supplier, “so that as well as having catalogue records which describe essentially what was in the Library and what the provenance was, we could actually link that in an integrated way to a record of preservation and conservation treatment”. This new functionality was then “embedded in the product”, becoming available to other customers in turn. (Q 252)
- 7.7. Dr Field conceded that 10 or 20 years earlier the British Library might simply have developed “a stand-alone system just for dealing with preservation and conservation.” This shift in approach is typical of many organisations in the public sector, which are seeking to move from fragmented, stand-alone, often home-grown systems, to a more integrated approach, using more accessible software based in many cases on generic products. Indeed, in a separate project the British Library is currently working in partnership with Microsoft both to digitise 100,000 out-of-copyright books, and to deliver search results for this content through the MSN Book Search service.
- 7.8. We applaud the British Library’s enterprise in developing ICT systems in partnership with the private sector, but their approach begs the question of whether there should be clearer and more uniform standards across the heritage sector for documentation and electronic record management. Indeed, there seems to be some uncertainty over who should be responsible for setting such standards in the first place. While the MDA described itself as “the UK’s lead organisation for knowledge and information management in museums, galleries and heritage sites”, it lacks teeth. For instance, we received no evidence to suggest that MDA-approved best practice was enforced by means of the museum accreditation scheme administered by its parent body, the MLA.
- 7.9. Furthermore, there appears to be some uncertainty over the division of responsibility for advising on electronic document and record management between the MDA and the National Archives. As Dr David Thomas explained, the National Archives, which are funded by the Department for Constitutional Affairs, have statutory responsibility for public records—that is to say, for the archives of the United Kingdom Government. This responsibility extends also to archives of publicly funded bodies, so the formal archives of the British Museum, for instance, would count as “public records”. However, other museum documentation, for instance that relating to collections management, would be “their own internal archives”. In respect of such records the National Archives have merely “an advisory role”. (Q 207)
- 7.10. Unless the National Archives and MDA work closely together, this division of responsibilities appears to be a recipe for confusion. When asked what the relationship between the two bodies was, Dr Thomas merely said, “We just have a collaborative relationship with them”. Later, Mr Poole again referred

to “another friendly relationship”. He went on to point out that the MDA had been given a mandate by the MLA to create a “national advisory service for museums, libraries and archives”, and was therefore “in the process of formalising our relationship with the National Archives ... it is very much our intention that we should encourage museums to benefit from the expertise that the National Archives can make available.” (QQ 208, 242)

- 7.11. In summary, the standard of electronic documentation in the heritage sector appears to be very uneven, but with some outstanding examples of good practice, particularly in the libraries and archives sector. We have been impressed by the work of the Museums Documentation Association, but are concerned that its purely advisory role, combined with limited resources, and its unclear relationship with other bodies such as the National Archives, may undermine its effectiveness.

Digitisation

- 7.12. The ability to digitise collections and artefacts is one of the key technological developments of recent times. It offers not only wider public access, through generally available electronic media, but in many cases better quality of access—more information, or, in some cases, access to objects through “virtual” re-creation. For instance, the evidence from the British Library referred to the International Dunhuang project, which “virtually re-assembles Buddhist scroll fragments from the Dunhuang area on the Silk Road which have been dispersed to institutions in London, St Petersburg, Paris and Beijing.” (p. 91)
- 7.13. The possibilities of digitisation technology for learning, research or pleasure are enormous. Chris Batt drew attention to the “People’s Network” initiative, led by the MLA, which since 2001 has helped in “the creation of ICT learning centres in all 4,300 libraries across the whole of the UK”, and has been instrumental in the rapid extension of broadband internet access. (Q 314)
- 7.14. Furthermore, digitisation may in certain circumstances ensure the long-term preservation of materials otherwise at risk of complete loss—as in the case of sound recordings, certain types of film stock, video and so on, which without digitisation would be lost as fast as the supporting medium perishes. Digitisation is therefore a key preservation tool.
- 7.15. The scale of digitisation, particularly in the libraries and archives sector, is astonishing. For example, the size of the British Library’s digital collection, at the time of the inquiry, stood at 200 Terabytes³¹. This is being added to all the time: the Library’s strategic partnership with Microsoft is intended “to digitise 25 million pages of content from the Library’s collections” in 2006-07 alone. As the interface between readers and digital records improves (for instance, through the Library’s interactive “Turning the Pages” programme, which makes its collection of rare historic manuscripts available for examination online) the pace of digitisation is likely only to increase. (p. 91)
- 7.16. At the same time, the rapid progress of digitisation presents major challenges. The first is the long-term management of digitised records. In the words of the Institution of Electrical Engineers, “the rate at which IT storage media and their playback systems become obsolete” is a constant danger, affecting

³¹ 200 Terabytes equals 200 million Megabytes.

both hardware (for instance, information stored on early 5¼ inch floppy disks is now generally inaccessible) and software (up to date operating systems in many cases do not support old versions). Governments as well as heritage organisations are increasingly waking up to the risk that such information could in future be lost totally, and in the United States the Library of Congress is running a \$100 million digital preservation programme, the National Digital Information Infrastructure and Preservation Programme. (p. 260)

7.17. In the United Kingdom, the Digital Preservation Coalition was established in 2001 to address such issues, and includes among its members not only the British Library and the National Archives, but the MLA, a number of universities, and libraries and archives from the devolved administrations. Both the British Library and National Archives are active in research into digital preservation:

- The British Library currently leads on a major EU-wide project, PLANETs (Preservation and Long-term Access through NETworked Services), funded through the EU's 6th Framework Programme for Research, and including within the project consortium "15 European national libraries and archives, universities and commercial organisations, including the Dutch national library and Microsoft". As Dr Field told us, the BL is investing heavily, "in seven figures every year", in the development of a digital asset management system. It is also building relationships with publishers, in order "to start influencing digital materials at the point of their birth rather than simply taking them in to worry about how we can deal with a problem there". (p. 87, Q 237)
- The National Archives is investing in a programme called "Seamless Flow", to develop a system to transfer and store electronic records from Government departments. However, Dr Thomas noted that despite this investment, the key vulnerability for such records remained the point at which the department concerned ceased to use them but had yet to deposit them with the Archives. The Archives was currently "looking at the possibility of a collaborative project with government departments" to develop an "intermediate store" where such records could be stored "until they are either destroyed or transferred to the Archives." (Q 237)

7.18. Other bodies are addressing similar issues in other sectors—for instance, the Joint Information Systems Committee (JISC) has since 2003 run a Digital Preservation Programme for the higher education sector.³² But clearly the more broadly based solutions are, and the more involvement there is from the originators of digital records, and major commercial organisations such as Microsoft, the greater the chance that such records, once stored, will remain generally accessible—establishing common standards will be critical.

7.19. As far as museums and galleries are concerned, the role of the MDA is to spread good practice. In Mr Poole's words, "we ... look at the environment in which museums are digitising and the ways in which they digitise ... and see where there are existing professional standards which exist and encourage museums to adopt those standards". He felt that the MDA was performing this task "reasonably successfully", although conceding that it was "much easier where there is a single source of concerted funding for investment in

³² See http://www.jisc.ac.uk/index.cfm?name=programme_preservation.

digitisation work to stipulate standards”. On the other hand, when that work was being undertaken by individual organisations, the MDA’s role was simply to “mediate between the technical standards and those institutions that want to apply them.” (QQ 239–240)

- 7.20. The view of the British Library was less sanguine. Dr Clive Field drew our attention to a recent National Audit Office (NAO) Report, which, while it had “commented favourably on what the British Library had been doing in terms of digitisation”, had also noted “the lack of a national framework for what was being digitised and how it was being made available.” In fact the NAO concluded that the risk of a multiplicity of digitisation standards could only be avoided if “major funders of digitisation and major digitisers and repositories of digital materials, such as the British Library and many of DCMS’ non-Departmental Public Bodies co-operate to resolve these issues in consultation with the sector more broadly.”³³ (Q 247)
- 7.21. Dr Field appeared to suggest that little had changed since the NAO Report. He commented that although the Library itself continued to work collaboratively with a range of bodies such as JISC, the situation remained “very piecemeal ... we would be the first to concede that more needs to be done in the UK in terms of providing access to this in a holistic and seamless manner.” Dr Thomas, of the National Archives, agreed: “it is a very confusing and messy situation”. He continued, in the process underlining the importance of the NAO’s reference to the “major funders” of digitisation, that “we have to get the funding from where we can.” (Q 247)
- 7.22. Another key issue is the extent to which digital records are technically useable, given the constant development of software and the extent to which the capabilities of standard desktop hardware lag behind. As Dr Thomas explained, when the National Archives started to digitise records and put them on the Internet “one of the main concerns we had was the fact that not everybody had broadband and we had to restrict the file size we delivered to about 1MB”. Documents thus had to be cut “into chunks and delivered in quite small packages”. With the rapid extension of broadband the Archives are now considering delivering information in larger packages, but compromises still have to be struck between file quality (particularly for colour images) and download speeds. (Q 251)
- 7.23. These technical limitations apply still more markedly to three-dimensional images. As Mr Poole observed, “Three-dimensional walks around things like Grecian urns are necessarily huge file sizes and require embedded technologies.” There is little prospect in the immediate future that desktop equipment will allow general access to such images. As a result, the MDA’s advice is for museums to “create a high-quality source image at the point of digitisation”, which is then preserved, while lesser quality images are made available for general use. (Q 251)

“Born digital” materials

- 7.24. Cultural materials that are “born digital” face similar problems of long-term preservation to digitised records of existing records and artefacts. However, whereas the loss or inaccessibility of digitised records of documents such as,

³³ National Audit Office, *The British Library: Providing Services Beyond the Reading Rooms* (July 2004, HC 879), p. 19.

for example, census records, could be rectified, albeit at high expense, “born digital” materials do not routinely have hard copy “back up”. In Ms Helen Shenton’s words, “From a stewardship point of view it is probably the most urgent issue ... because there is the potential for total loss.” (Q 237)

- 7.25. Increasing volumes of material are born in digital format—for instance, many Government publications are now issued only in electronic form, and we have already noted their vulnerability pending storage in the National Archives. The prevalence of electronic publication is likely to increase further—indeed, as the British Library noted, the passage of the legal Deposit Libraries Act 2003 extended the scope of legal deposit to electronic publications. In addition, the complexity and size of such records is likely to increase as well—for instance, there is increasing numbers of historically important web-based records, such as the BBC’s People’s War archive. The risks will only increase over time.
- 7.26. While the risks to “born digital” materials are more acute than to digitised records of conventional materials, the issues that have to be addressed are fundamentally similar. Thus the points made in the previous section apply equally in this context.

New technologies and conservation

- 7.27. The value of ICT for conservation will be clear from the previous sections. Not only does it assist in collecting and storing information about cultural artefacts, but in disseminating such information more widely and accessibly, both to researchers and the general public, as well as in the preservation of fragile objects themselves. An example was given by English Heritage, which, at Richmond Castle, has used closed circuit television “to provide visual access to the poignant graffiti of Conscientious Objectors held in gaol cells here during World War I.” Without such technology, the original graffiti, drawn on fragile plaster walls in narrow spaces, “would be at risk of loss through abrasion”. More broadly, English Heritage drew attention to the increasing use of new technology to provide virtual access to less mobile visitors to otherwise inaccessible locations. (p. 119)
- 7.28. Digitisation is of particular importance in the Natural History Museum (NHM). Here the collection is, in the words of the Director, Mr Michael Dixon, made up of “items that were recently living and of course as soon as things die they start to decompose”. Not only does long-term preservation present unique challenges, but in some circumstances researchers may be able to glean as much from a scanned image as from the original object. In addition, the data derived from analysis of particular specimens, for instance their DNA sequences, may be of great value to researchers irrespective of the survival of the specimens themselves. Thus digitisation, along with a high level of accessibility to researchers, and an active loans programme, jointly contribute to the NHM’s international role as a centre of natural history research. (QQ 485, 515)
- 7.29. More generally, the growing importance of new technology in expanding public access to cultural heritage is undeniable. According to the Office of National Statistics, by April 2006 57 percent of households in Great Britain had Internet access, an increase of 26 percent since 2002, and of these 69

percent had broadband access.³⁴ Even allowing for the caveats above, this presents a unique opportunity to extend and deepen public understanding of our cultural heritage.

- 7.30. At present the level of support for the use of ICT in the heritage sector is patchy. Within the museum sector, the “24 Hour Museum” provides a portal to museums across the country, and is used, as the MDA noted, by over one million people each month. On the other hand, some other Internet-based sources of information are much less well supported and integrated. For instance, the impressive “Engineering Timelines” website³⁵, which celebrates the nation’s engineering heritage, and which has enormous potential as an educational and information source for students and visitors to sites of engineering heritage, has been privately funded by WhitbyBird, without any public support. At the time of our inquiry the long-term future of the site was uncertain. (pp. 84, 277)
- 7.31. At the same time, some witnesses struck a note of caution regarding the role of ICT. The Society for the Protection of Ancient Buildings (SPAB) argued that “caution should be exercised to ensure that [ICT] does not become a ready substitute for the real visitor experience”, and expressed alarm at the concept of “preservation by record”—the view in some quarters that this could somehow justify a higher number of demolitions. The Royal Academy of Engineering also cautioned that Internet-based experience of artefacts should be seen as “ancillary to an experience of the artefact or structure itself, not a substitute.” (pp. 54, 275)
- 7.32. Underlying these concerns is a debate about the way in which people experience them, and the inherent value of those objects. This is ultimately a philosophical debate, which we are not in a position to resolve. The Government, in pursuit of their policy of promoting public access, are clear that, in the words of Mr Paul Kirkman, “a collection is there and has value only insofar as it is used”. This appeared also to be Mr Lammy’s view (see above, paragraph 2.5). On the other hand, it was striking that in the course of our visit to Italy, many of those we talked to clearly assumed that the original objects possessed a value in their own right, irrespective of public access. (Q 29)
- 7.33. A more nuanced view of the relationship between original artefacts and the information surrounding such objects that contributes to their value was expressed by the MDA:

“An object of cultural importance consists of two elements. First, there is the physical object. Second, there is the information about what the object is, where it is from, who owned it and all the other elements which combine to make it significant. Very often, without the information about the history of the object, its significance is lost.” (p. 83)

Nevertheless, however crucial the information generated about cultural artefacts is to understanding their significance, we agree with the Society for the Protection of Ancient Buildings that first-hand experience of the original artefacts is irreplaceable. It is thus essential that resources devoted to digitisation should not detract from conservation of original artefacts, and

³⁴ See <http://www.statistics.gov.uk/cci/nugget.asp?id=8>.

³⁵ See <http://www.engineering-timelines.com/timelines.asp>.

that the extension of public access through electronic media should not result in ever fewer original objects being conserved.

- 7.34. Looking further ahead, ICT continues to develop at extraordinary speed. We are not in a position to anticipate the possibilities that will open up in coming years, although we had a glimpse of some of them during our visit to the Conservation Centre at National Museums Liverpool. Here we saw 3D laser scanning in operation, and enjoyed a demonstration of “haptic” technology (more familiar in the world of medicine, where it is used in training surgeons), allowing manipulation of sculptures in a virtual, three-dimensional environment. In the case of a medieval sculpture of St Christopher, the combination of 3D scanning with analysis of surviving paint fragments allowed the original colours to be restored on screen. Such technologies are likely to become generally available, both as learning tools and for pleasure, in the coming years.
- 7.35. It is essential for the long-term health of the heritage sector that it should be able to draw tangible benefit from such enhancements of public access. This will necessarily involve the sector in new commercial activities and partnerships. National Museums Liverpool have developed both laser scanning and laser cleaning technologies in recent years, in part thanks to Public Sector Research Exploitation grants, but also with private funding from the Leverhulme Trust, and in collaboration with institutions such as the Daresbury Laboratory. The resulting technologies have wide commercial applications—for instance, laser scanning is increasingly used to record the condition of at-risk objects in advance of conservation or restoration, as in the case of the terracotta roundels at Hampton Court Palace. The laser-scanned image of one of these is illustrated on the front cover of this Report.
- 7.36. However, the commercial applications could go far beyond the world of conservation—for instance, 3D laser scanning can allow the reproduction of exact three-dimensional facsimiles, scaled up or down, of sculptures. However, the long-term status of the sculpture studio at Liverpool, which has developed this technology largely in-house, and the arrangements for its future commercial activities, was still uncertain at the time of our visit. Meanwhile the staff concerned were mostly on short-term contracts, and the possibility of their expertise being lost to commercial competitors in the United Kingdom, Europe or the United States, was obvious.
- 7.37. We do not suggest that museums are well suited to exploit ICT-based commercial opportunities, or that this would be compatible with their core functions. However, the nature of new technology is such that museums, like universities before them, will increasingly need to find ways to combine their core activities of public education and conservation with the encouragement of enterprise. In some cases this may lead to durable, mutually beneficial partnerships with industry. But at the same time it is essential that such partnerships should not compromise the principles of open access upon which our major libraries and museums have been built, and that intellectual property rights are, where appropriate, secured for the public good.
- 7.38. We saw the other side of the coin when we visited the National Gallery, where much of the equipment, including large-format printers, had been donated by Hewlett Packard. However, the company was about to end its support, and no replacement sponsor had yet been found. This illustrates, in turn, the vulnerability of too great a dependence on one sponsor. Thus, while the heritage sector needs to be more proactive in finding new ways to enter

into partnership with the private sector, it will continue to upon the public sector to provide its core, long-term funding needs.

Recommendations

- 7.39. In 2004 the National Audit Office highlighted the lack of a national framework for the digitisation of records across museums, libraries and archives. Little progress has since been made. We recommend that the Government, through the Museums, Libraries and Archives Council, and in consultation with the devolved administrations, make every effort to facilitate the development of such a framework for the sector.**
- 7.40. The Museum Documentation Association (MDA) is working hard to promote best practice and common standards in the use of ICT in museums, libraries and archives. However, it lacks teeth, and we therefore recommend that its parent body, the Museums, Libraries and Archives Council, incorporate MDA approved standards for the use of ICT as part of the museum accreditation scheme.**
- 7.41. We further recommend that the MDA and National Archives formalise their relationship, with a view to clarifying their different areas of responsibility, as a matter of urgency.**
- 7.42. In order to keep abreast of progress in technology, the heritage sector needs to develop closer partnerships with industry, exploiting and marketing new commercial opportunities as they arise—although such partnerships should not replace long term core public funding to support investment in conservation and heritage science. We therefore recommend that the National Museums and Galleries, along with the MLA, drawing on experience in the universities and Research Councils, explore ways to provide a central source of information and support for the development of commercial partnerships.**

CHAPTER 8: A STRATEGY FOR HERITAGE SCIENCE

Do we need a strategy?

- 8.1. We have in earlier chapters recommended that the Department for Culture, Media and Sport (DCMS) should review its departmental objectives, to include reference to the importance of conservation, and that, supported by a suitably qualified Chief Scientific Adviser, it should “champion” heritage science. We have also recommended that the Arts and Humanities Research Council instigate a directed programme of research to build capacity in the sector.
- 8.2. However, these recommendations will not in themselves be enough to remedy the problems we have identified, unless the sector itself is able to co-ordinate heritage science research more effectively, identifying priorities, pooling resources and knowledge, working together towards common goals.
- 8.3. At the moment the sector is fragmented and widely dispersed. There are many players: the DCMS and its agencies, the devolved administrations, the National Museums and Galleries, universities, Research Councils, botanic gardens, private sponsors and the charitable sector. Although elements of strategy are being developed in particular areas (notably by English Heritage in the sphere of the historic environment, and in the libraries and archives sector), there is no strategy for the sector as a whole.
- 8.4. At the same time the heritage sector is vitally important both economically, in terms of its current exploitation for leisure, pleasure and tourism, and in terms of long-term sustainability—our responsibility to preserve assets, cultural as well as natural, for future generations. Heritage science can add considerable value on both fronts; but far from exploiting this potential, there is real danger that opportunities will be allowed to slip away, because of the fragmented nature of the sector.
- 8.5. In view of the many problems and risks identified in this Report, we believe that there is now an urgent need for a comprehensive strategy for heritage science. In this chapter we ask what such a strategy should cover, and how it should be developed and implemented.

Scope

- 8.6. At every stage in our inquiry we have been conscious of the divisions between the various parts of the heritage sector, in particular that between the historic built environment on the one hand (the “immoveable heritage”), and on the other the moveable heritage, exemplified by the major collections held by the National Museums and Galleries. In addition, of course, there is the libraries and archives sector, which is developing its own research strategy under the leadership of the British Library and National Archives.
- 8.7. But do such divisions make sense? English Heritage, the leading agency in the historic built environment, also holds major collections of furniture and works of art, and its historic properties are in many cases accredited as museums by the Museums, Libraries and Archives Council (MLA). The same applies to the National Trust, Historic Royal Palaces, and to many private owners of historic properties. On the other side of the coin, many of the National Museums and Galleries are housed in historically and

architecturally important buildings, and issues of preventive conservation affecting their collections are bound up with the maintenance of the built environment.

- 8.8. Nor do science and technology respect the divisions between “moveable” and “immoveable” heritage. Our front cover reproduces three-dimensional laser-scanned images of a sixteenth century terracotta roundel. This technology is an invaluable aid in monitoring the condition of the roundels, which are mounted on the walls of Hampton Court Palace, but we also saw a demonstration of very similar technology during our visit to the National Museum of Liverpool, where it is used to scan sculptures from the museum’s “moveable” collection. There is huge potential to develop synergies between the “immoveable” and “moveable” sectors.
- 8.9. The consequences of the current split are highly damaging, in reducing the effectiveness of heritage science as a whole. As Professor Norman Tennent said:

“The problem is in Britain that there is this split between moveable and immoveable cultural heritage ... different organisations have their own responsibilities ... some mélange of DCMS, English Heritage and Historic Scotland, I do not know what, which ensures cohesive, comprehensive overview and enabling of funding, would be the ideal.” (Q 162)

We agree. The division between “moveable” and “immoveable” reflects artificial bureaucratic structures, rather than inherent differences between two kinds of heritage. It is essential that any strategy for heritage science should embrace all parts of our cultural heritage.

A National Conservation Centre?

- 8.10. Our support for a strategy for heritage science begs the question of whether the United Kingdom would benefit from the establishment of a National Conservation Centre. We have already referred to some countries—notably Canada and the Netherlands—that have opted to go down this path, with considerable success. The need for a strategy to promote co-ordination between the various players in this complex sector might be obviated if there were such a research centre. However, we have also drawn attention to the different circumstances applying to both those countries—Canada’s vast size and small population, and the Netherlands’ centralised approach, through the Delta Plan for cultural preservation, to identifying conservation needs. The success of national conservation centres in Canada and the Netherlands, while it indicates a possible way forward, does not mean that a national centre is the only possible model.
- 8.11. In fact, our inquiry revealed very little support for the establishment of a national conservation centre. The nearest thing to support came from the MLA, which drew attention to the rejection of the idea in the early 1990s, because of “insufficient support from the national museums”, and suggested that “this may be an opportune time to re-visit this idea ... particularly to look at the needs of the non-fine art collections”. However, in oral evidence the MLA’s Chief Executive, Mr Chris Batt, was less supportive: “the critical task is ... not to produce one single place where all this can happen but to produce the co-ordination that ensures that whatever is done is in collaboration and that for the person that wants to find out there is a route into it which is not institution specific”. (p. 125, Q 319)

- 8.12. There was also general agreement that the sector's fragmentation, whatever problems it might create, had at least contributed to a highly diverse research effort. Focusing resources on a national centre could therefore be counter-productive. As Dr Eric May said, a national centre might "suck money into the centre which would probably lead to a loss of diversity. The irony is that at the moment we have a really diverse range of activities throughout the UK. What we want to avoid really is putting all of the money into one particular centre where it would then be more difficult for the diversity to be maintained." (Q 163)
- 8.13. The NMGs drew attention to a risk that a national centre might detract from the fundamentally collections-based nature of their scientific work. In the words of Dr David Saunders of the British Museum, "a lot of the work conducted in museums is very collection-focused and that work, I think, would probably have to remain within the individual museums". On the other hand, he did think that might be a possibility for "a degree of the work done by each museum to be pooled centrally", possibly by means of a "virtual centre" by means of which a network of contacts could be "established and maintained". Neil MacGregor refined this idea further, suggesting that what was needed was "not so much a virtual as a distributed centre or a conservation centre of excellence." (QQ 369, 372)
- 8.14. In summary, whatever advantages a national conservation centre might bring, there does not appear to be sufficient support within the heritage sector to render its establishment feasible at present. We also agree with our witnesses that a "distributed centre" might itself bring its own advantages, making it easier for all interested parties to contribute—not just conservation scientists from the NMGs, but university-based scientists, the Research Councils, end-users such as the National Trust and Historic Royal Palaces, and various professional or voluntary bodies such as Icon, the Institution of Civil Engineers, the Cathedral Architects' Association, the Society for the Protection of Ancient Buildings, and so on. It would also, crucially, avoid creating institutional barriers to the participation of institutions and individuals from across the United Kingdom, including Scotland, Wales and Northern Ireland.
- 8.15. We therefore turn next to considering how best a "distributed centre"—that is, a co-ordinated network of scientists and interested bodies across the United Kingdom, supported by a strategic analysis of national heritage research priorities—might work in practice, and how its effectiveness would be monitored.

Support for the development of a national strategy

- 8.16. Any strategy for heritage science would have to be developed as a partnership between the many interested parties, some of which have been listed above. However, for a strategy to work someone must be given responsibility for providing organisational support and momentum. Various possibilities were mooted in the course of our inquiry.

The Department for Culture, Media and Sport

- 8.17. We have already recommended that DCMS should make conservation one of its strategic priorities, and that it should "champion" heritage science within Government. We have further recommended that the Department should appoint an expert from the natural or physical sciences as its Chief

Scientific Adviser, in order that it may in future act as an intelligent customer of the science undertaken by its NDPBs. However, we do not see these recommendations as meaning that the Department should take a “hands on” role in shaping a strategy for heritage science. There appears to be no support for such a development from within the heritage sector. What is needed from the Department is intelligent support.

The Research Councils

- 8.18. The Research Councils, in particular the Arts and Humanities Research Council, will be crucial to the success of a national strategy for heritage science. They are uniquely well-placed to deliver large-scale funding, UK-wide, for the major collaborative research projects that would grow out of such a strategy, and we have already recommended that the AHRC co-ordinates a directed programme of research in the area of heritage science. As Professor Brimblecombe argued, “if we really want to promote this seriously, ultimately [funding] has to come from research councils.” (Q 144)
- 8.19. Furthermore, while the Government steadily increase investment in research, in line with the Lisbon target that 3 percent of GDP should be spent on R&D by 2010, budgets for the NMGs remain flat or in decline. For the National Museums and Galleries (NMGs), balancing the cost of expensive scientific research and analysis against promoting access, funding acquisitions, and so on, the prospect that a larger proportion of the £3 billion budget of the Research Councils might find its way to their conservation science departments is bound to be attractive. It is not perhaps surprising therefore that Mr Neil MacGregor, Director of the British Museum, should argue that “the leadership, championship and the devising of a co-ordinated strategy should lie” in the Research Councils. (Q 338)
- 8.20. But is this the right approach? For the NMGs, the Research Councils represent a new source of funding at a time when core budgets are being squeezed. In Mr MacGregor’s words, “It is important there be a champion for the funding of this activity which is separate from DCMS because DCMS budgets are fixed and perhaps declining”. Yet the responsive mode, which still prevails in Research Council funding of this area, is inherently competitive—it places the onus on applicants to develop high quality, collaborative research proposals, which can hold their own against competitors in all areas covered by the Research Council in question. We have already drawn attention to the many barriers to the preparation of such proposals within the heritage sector, not least of which is the lack of infrastructure within the NMGs themselves to support them. (Q 344)
- 8.21. We have also quoted the comment of Professor Randal Richards, of the EPSRC, that “one way to get research in this area going is if somebody has identified national priorities”. This is the key point: the task facing the heritage sector is to identify needs and priorities in a more co-ordinated manner than it has done hitherto. As the Institute of Conservation Science said, “There is no national risk assessment for the UK heritage, and therefore no list of research priorities.” Professor Norman Tennent made a similar point: “there is no national co-ordination ... There is no way ... of seeing whether there is too much research on one topic and absolutely not enough research on other topics.” (Q 69, p. 178, Q 146)
- 8.22. In the absence of any agreed identification of research priorities, there is no case for inviting the Research Councils to take the lead in the sector, or to

earmark major funds for heritage science. While we have recommended that the Research Councils institute a directed programme of research, before this can happen the onus must be on the sector itself to act in a more co-ordinated way, establishing research priorities, and demonstrating competence in applying for funds and running projects. Only if this happens is the sector likely to be in a position to persuade the Research Councils of the case for a time-limited (say, 5-year) directed programme of research. But the lead has to come from within the sector itself.

The Museums, Libraries and Archives Council

- 8.23. The MLA, as the body responsible for museum accreditation, appears to be in some ways well placed to take on a co-ordinating role in defining and disseminating the outputs of heritage science research, in terms of defining standards for conservation of the moveable heritage. However, the MLA does not see itself as a “conservation agency” (Q 263)—nor indeed does it possess any scientific expertise. Its evolving Research and Evidence Strategy makes no reference to conservation; indeed, even that element of museum accreditation that requires monitoring of conservation standards is in practice delegated to the Institute of Conservation. Finally, the MLA has just undergone wholesale restructuring, and now works in partnership with nine regional agencies across England.
- 8.24. The MLA’s regional network could be invaluable in communicating the fruits of any strategy for heritage science to regional museums in England, and we therefore believe that the MLA should be a partner in the implementation of any strategy for heritage science. However, we do not believe that the MLA is the right organisation to take the lead in developing this strategy.

The British Museum

- 8.25. It would be possible for one of the National Museums and Galleries to support the development of a network of researchers, possibly by hosting a research “hub”. This option was outlined in a supplementary written memorandum by the British Museum (see pp. 165-166), which drew attention to the precedent in the existing Portable Antiquities Scheme. As Neil MacGregor argued, this “provides a very clear structure for co-ordination and dissemination”. It is “run by archaeologists ... based in the British Museum”, and the various elements of the scheme were “open to tender”. Mr MacGregor recommended a comparable scheme, “led by one of the national museums ... funded by two research councils”, as a “good model” for heritage science. (Q 339)
- 8.26. This suggestion has much to recommend it—above all, the undoubted success of the Portable Antiquities Scheme. However, there are also weighty arguments against this approach:
- There must be some doubt as to whether the model of the Portable Antiquities Scheme could be applied to heritage science as a whole. None of the NMGs possesses the range of expertise sufficient to identify and co-ordinate national priorities for research across so broad a field. While the NMGs are not strangers to collaboration, in many cases their significant in-house scientific resources are accustomed to meeting their own collection needs. They do not, in many cases, have experience of

putting together complex, inter-disciplinary collaborative projects, involving university-based researchers in the United Kingdom and abroad, as well as end-users of research.

- The NMGs are for the most part funded by DCMS through grant-in-aid. We do not feel that a strategy for heritage science that in effect shifted the onus to the Research Councils, leaving the Department, in Mr MacGregor's words, to "play no part in setting strategic priorities" is appropriate. (Q 345)
- The NMGs are fundamentally concerned with the moveable heritage represented by their collections. If, as we have argued above, the ideal is to exploit synergies between the moveable and immovable sectors, and ultimately to develop a national strategy for heritage science as a whole, the NMGs are not best placed to take the lead.

8.27. In conclusion, while the NMGs will undoubtedly be key contributors to a national strategy for heritage science, we do not believe that the model of the Portable Antiquities Scheme is applicable to this wider field.

The Institute of Conservation

8.28. In recent years the Institute of Conservation (Icon) has been formed by the amalgamation of many smaller bodies, including, on 5 June 2006, the Institute of Conservation Science (ICS), to create a single body representing the conservation and conservation science professions, with some 3,000 individual and institutional members. Most of these members are involved in the conservation of the moveable, rather than the immovable heritage, but nevertheless the emergence of Icon is a very welcome development, which should allow the conservation profession to speak with an increasingly clear and influential voice as time passes.

8.29. The prospect of a merger between Icon and the ICS was hailed by Alistair McCapra, the Chief Executive of Icon, as overcoming the historical lack of a "clear means for the conservation community to communicate its needs to the research community". He looked forward to the appointment of a "co-ordinator" within Icon who would "open up that channel of communication". His colleague David Leigh provided more detail, suggesting that the role could be funded for an initial five-year period by the Research Councils. Among the co-ordinator's tasks would be to:

"survey the needs of conservation, to identify the gaps, to search out the relevant collaborators and the facilities, the scientists and the conservators ... to propose projects, to nurture applications, to actually train applicants in creating and then finessing applications ... to scan the European and other funding sources ... to ensure publication and proper dissemination and generally to act as advocate for conservation science". (QQ 391, 393)

8.30. This is an ambitious job specification—indeed, it corresponds very closely to what we understand by the development of a national strategy for heritage science. We do not believe that it could possibly be undertaken by one person. The question is whether Icon has the resources or infrastructure to back up such a post, even if the post itself were funded by the Research Councils. Icon will undoubtedly have a key role as a strategy is developed, above all in giving voice to the needs of the conservation and conservation science professions, and in disseminating the output of the strategy to these professions. However, on balance we do not believe that a single co-ordinator

will be enough, and we do not believe that Icon has the resources to support the more ambitious national strategy-setting exercise that is now needed.

English Heritage

- 8.31. English Heritage is a major custodian of our cultural heritage, managing on behalf of the Government archaeological sites, whether on land or sea, ruins, buildings and landscapes. Although not primarily a custodian of moveable heritage, many of its properties contain significant collections of works of art, furnishings and so on. English Heritage also has statutory responsibility to advise on planning issues affecting the historic built environment. With its annual budget of some £165 million, and 1,800 staff, it is by some margin the largest public sector organisation active within the heritage sector.
- 8.32. In the context of this inquiry a key fact is the extensive use that English Heritage makes of scientific research. It invests around £1.6 million per annum in conservation science, and has also participated in a number of major international and national collaborative projects. For instance it led on the EU's 4th Framework Programme project 'Woodcare', and disseminated results through the publication of English Heritage research Transactions on 'Timber Decay in Buildings' (see Q 323). It also participated actively in the Dust project (see Box 2), in the process attracting significant external funding.
- 8.33. Finally, as we have already described, following the publication of its Research Strategy in 2005 English Heritage, along with four of the Research Councils, co-sponsored a workshop in Birmingham in March 2006, under the title "Preserving our Past", at which five cross-cutting themes for research networks in the historic environment were identified.
- 8.34. In oral evidence the Chairman of English Heritage, Sir Neil Cossons, welcomed the prospect of a strategy covering not just the historic built environment, but all aspects of heritage science—"we certainly think there should be an overarching strategy". He also appeared to offer the services of English Heritage to develop such a strategy. He drew attention to recent developments in the built environment, where English Heritage had "offered to our partners in the other home countries the potential to ... provide a secretariat for some sort of improved co-ordination". He then continued: "My feeling is that it would be useful to see that partnership go into the area of moveable objects, typically the sorts of things that are the responsibility of museums, because the overlaps both in terms of science and scientific expertise are considerable". (Q 284)
- 8.35. This is a welcome offer. English Heritage's experience of co-ordinating research into the built environment, along with its size and resources, suggest that it could feasibly support the development of strategic priorities for heritage science as a whole. It also has a track record of working closely with the Research Councils and other funders. Professor McEnery, of the AHRC, described English Heritage as "a key player" and the "main point of contact" between the Research Councils and DCMS; he also paid tribute to the "very good working relationship with English Heritage". Ms Katie Lithgow of the National Trust also noted that English Heritage had "worked as partners and collaborators very well with us", and greeted the suggestion that it might co-ordinate research in the moveable as well as immovable heritage as "very serendipitous". (QQ 64, 576–577)

- 8.36. This is not to say that there would not be difficulties in giving English Heritage such a role. For instance, English Heritage covers only England, and has no jurisdiction in Scotland, Wales or Northern Ireland. However, this has not prevented English Heritage from successfully providing a secretariat to co-ordinate the work of its partner agencies across the United Kingdom in the field of the historic environment. Similarly, there might be a risk that the leading organisations in the field of moveable heritage—notably the National Museums and Galleries—would resist English Heritage’s assumption of a greater role in this area.
- 8.37. The key would be to work sensitively and in partnership—as Sir Neil Cossons made clear, the fact that English Heritage provided the resources for its partner agencies in the field of historic environment was “not in any way to rule the roost”. He made it clear that the object of a strategy across the whole of heritage science would be to bring together the “key players in the various fields of expertise”, to form a “liaison group”. In other words, while English Heritage would provide a secretariat, and would draw on its previous experience in planning the stages through which any strategy would pass, the strategy itself would be developed in partnership, with full contributions from all the key players.
- 8.38. In summary, we believe that, on balance, English Heritage is the best placed body to co-ordinate and provide administrative support for the development of a national strategy for heritage science.

How the strategy would be developed

- 8.39. We have already noted that the success of the strategy would rely on full contributions from all the key players. The liaison or steering group charged with developing the strategy would thus have to be broad-based, ensuring that any strategy was driven from the bottom up, by the “users” and “doers” of research. The former include bodies such as the National Trust, Historic Royal Palaces, smaller regional museums, represented by the MLA, and conservation professionals, represented by Icon, IHBC, SPAB and so on; the latter include the National Museums and Galleries, the British Library and National Archives, and the universities. The Research Councils would have a seat at the table, in order to assist in identifying research priorities. The devolved administrations and public heritage conservation institutions would also have to be represented, to ensure United Kingdom-wide coverage. Where appropriate, other bodies would be invited to contribute—for instance, the MDA could contribute to discussion of the benefits and risks of digitisation.
- 8.40. There would be no need for the participants to reinvent the wheel. Wherever possible, it would be desirable to build on existing achievements, such as the developing research strategy for the built environment, led by English Heritage, the strategy for libraries and archives developed by the British Library and National Archives, and initiatives in specific areas such as the Portable Antiquities Scheme, co-ordinated by the British Museum.
- 8.41. The process we are describing will not be possible without support from the Government. Indeed, we believe that DCMS, through its Chief Scientific Adviser, should chair meetings—not setting the agenda, but providing impartial advice and good offices as necessary. However, much depends on the terms of appointment of the Chief Scientific Adviser, and whether he or she felt competent to lead such an exercise. It is notable that when Sir Neil

Cosson's offer to provide a secretariat to support the development of a strategy was put to the Minister, his response was a terse "I will look at it". We trust that in light of our Report, the Department will respond more enthusiastically, and with the best interests of the heritage sector at heart. (Q 448)

8.42. The steering group must focus clearly on implementation, and on the practical delivery of the strategy. There are many strategic plans, not least in the public sector, which are little more than theoretical exercises on paper. The only way a strategy in the heritage sector will work is if it is developed from the bottom up, with input from "users" and "doers", and with clear ownership of the targets set for each stage of its implementation.

The benefits of setting and implementing a strategy

8.43. If the sector can come together in the way we have described, many of the problems described in this Report can be overcome. The benefits can be summarised under the following headings:

- A comprehensive assessment of the present state of the United Kingdom's cultural heritage, and the risks it faces.
- Identification of the main priorities for scientific research.
- The creation of a forum in which potential partners from different fields or institutions could be brought together to develop collaborative research projects.
- A single source of logistical support and advice for those in the sector involved in preparing and submitting funding applications.
- Higher visibility and impact for the heritage sector, through the creation of a more cohesive "voice", one able, for example, to speak with authority to research funders.
- The development of new ways to disseminate research to conservation practitioners, develop skills and promote continuing professional development.

8.44. If these benefits can be realised a further consequence, already touched on in Chapter 6 above, could follow: by identifying risks and national research priorities, the sector would put itself in a position to make a case for a Research Council-funded, time-limited directed programme of research to build capacity in this key sector. More broadly, by providing a forum for dialogue between interested parties, "users" and "doers", the sector will gradually develop a more active, more cohesive, higher profile research community. Even without a directed programme, closer collaboration will lead to more competitive funding applications and better funding, which will contribute over time to making the conservation science profession better able to attract and retain top quality scientists.

8.45. Science plays a vital role in helping maintain and sustain our cultural heritage. New technologies are opening up exciting opportunities; however, the heritage sector in the United Kingdom is not well placed to seize these opportunities. It is essential that the sector, which by its nature is diverse and decentralised, finds a way to "get its act together". If, in the way we have recommended, it can do this, the benefits of heritage science could be enormous. We urge the Government, the major heritage institutions, the

universities and Research Councils, to work together to ensure that these opportunities are not wasted.

Recommendations

- 8.46. **We recommend the development of a comprehensive national strategy for heritage science, embracing both the immovable and moveable heritage, and covering the United Kingdom as a whole. We do not recommend the establishment of a National Conservation Centre at this stage, though this might be needed in the longer term if the sector does not come together as we have recommended.**
- 8.47. **We recommend that English Heritage provide the secretariat to support the development of this national strategy for heritage science. We call on the major heritage organisations in England, and their counterparts in Scotland, Wales and Northern Ireland, along with the universities and the Research Councils, to come together in establishing a steering group to take forward the implementation of this recommendation.**
- 8.48. **We recommend that the newly appointed Chief Scientific Adviser of the Department for Culture, Media and Sport chair and oversee the development of this strategy.**
- 8.49. **We further recommend that the strategy be developed as a “bottom up” strategy, with considerable input from the “users and doers” of heritage science, so that the many institutions that play a part in the heritage sector can share a sense of ownership.**
- 8.50. **In parallel, as the strategy develops, and research priorities are identified, we recommend that the Research Councils instigate a time-limited directed programme of research, to encourage collaborative projects and build capacity in heritage science.**

CHAPTER 9: SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

- 9.1. In this Chapter we set out our recommendations and conclusions in full. The numbers in brackets refer to the relevant paragraphs in the text.

The Department for Culture, Media and Sport

- 9.2. Under the current governance and funding structure the maintenance of the science base for conservation, and thus the long-term preservation of the United Kingdom's cultural heritage, are severely under threat. The Department for Culture, Media and Sport has hitherto failed to grasp the scale of this threat—indeed, probably does not know it exists. This must be put right. (3.46)
- 9.3. We recommend that the Department for Culture, Media and Sport review its departmental objectives in light of the Government's policy on sustainability. We recommend in particular that the Department add to its objectives an explicit reference to the need to conserve our cultural heritage for the benefit of future as well as existing communities. (2.23)
- 9.4. We recommend that the DCMS move rapidly towards the appointment of a permanent Chief Scientific Adviser, as recommended in 2004 by the Office of Science and Technology. (6.24)
- 9.5. DCMS does not currently possess the scientific expertise to act as an intelligent customer of science. This has prevented the Department from recognising the importance of heritage science to the preservation of our cultural heritage. It has also inhibited the Department from arguing effectively for the allocation of funds to the heritage sector from the European Union Framework Programmes for Research. We therefore recommend that the terms of reference for the new Chief Scientific Adviser make it clear that the appointee should have primary skills in the natural or physical sciences. (6.25)
- 9.6. Once appointed, we recommend that the DCMS Chief Scientific Adviser act as a “champion” at departmental level for heritage science. This is an essential prerequisite if an understanding of the value of science is to cascade down to the heritage sector as a whole, and the downgrading of conservation and heritage science within the sector is to be reversed. (6.26)

The Research Councils

- 9.7. We recommend that for the avoidance of doubt the Office of Science and Innovation should formally appoint the AHRC as the Research Council responsible for heritage science, and that at the same time it review the funding available to the AHRC from within the overall budget of the Research Councils so as to reflect the higher cost of scientific research. We further recommend that the OSI review the performance of the AHRC in this regard before the end of 2008. (6.43)
- 9.8. As champion for heritage, one of the key tasks of the Arts and Humanities Research Council will be to deliver an increase in Research Council funding for heritage science. In the absence of reliable data, it is currently impossible to measure success or failure in this task. We therefore recommend that the AHRC commission an analysis of current levels of Research Council funding

for heritage science, and that it publish the results and update them annually from now on. (6.44)

- 9.9. We recommend that the AHRC take steps to ensure that its responsibility for scientific research in the field of cultural heritage is reflected in the appointment of an appropriate “champion” at Council level, supported by qualified staff. (6.45)
- 9.10. We recommend that the AHRC, in conjunction with the other Research Councils and the heritage sector, bring forward proposals for a time-limited directed programme of research in heritage science, with the aim both of re-generating this area of research and of attracting younger scientists to enter it. (6.46)
- 9.11. We recommend that AHRC and the Office of Science and Innovation make a formal commitment to recognise the full cost of science-based research in field of cultural heritage. This commitment should be reflected in the size of individual awards and in the AHRC’s acceptance of full economic costs. (6.47)
- 9.12. We welcome the decision of the Arts and Humanities Research Council to invite applications from the National Museums and Galleries for academic analogue status. However, in order to promote collaboration with university based scientists we recommend that:
- All National Museums and Galleries seek academic analogue status with the appropriate science-based Research Councils, in addition to the AHRC;
 - That those Councils encourage and facilitate applications from the National Museums and Galleries in the same way that the AHRC has done. (4.26)

Dissemination of best practice and public engagement

- 9.13. Despite the outstanding quality of individual publications, the dissemination of up-to-date results of heritage science to practitioners in the United Kingdom is patchy and poorly co-ordinated, particularly in the field of moveable heritage. We therefore recommend that the Museums, Libraries and Archives Council, in consultation with the National Museums and Galleries and Icon, review and consolidate the sources of scientific guidance available for collections-based conservators, with a view to providing a regular, central source of up-to-date advice. (5.29)
- 9.14. We recommend that the Office of Science and Innovation undertake to provide the necessary resources to enable the Institute of Conservation to become the focus for the use of heritage science projects to promote public engagement with SET as a whole. (5.37)

Information and communications technologies

- 9.15. In 2004 the National Audit Office highlighted the lack of a national framework for the digitisation of records across museums, libraries and archives. Little progress has since been made. We recommend that the Government, through the Museums, Libraries and Archives Council, and in consultation with the devolved administrations, make every effort to facilitate the development of such a framework for the sector. (7.39)

- 9.16. The Museum Documentation Association (MDA) is working hard to promote best practice and common standards in the use of ICT in museums, libraries and archives. However, it lacks teeth, and we therefore recommend that its parent body, the Museums, Libraries and Archives Council, incorporate MDA approved standards for the use of ICT as part of the museum accreditation scheme. (7.40)
- 9.17. We further recommend that the MDA and National Archives formalise their relationship, with a view to clarifying their different areas of responsibility, as a matter of urgency. (7.41)
- 9.18. In order to keep abreast of progress in technology, the heritage sector needs to develop closer partnerships with industry, exploiting and marketing new commercial opportunities as they arise—although such partnerships should not replace long term core public funding to support investment in conservation and heritage science. We therefore recommend that the National Museums and Galleries, along with the MLA, drawing on experience in the universities and Research Councils, explore ways to provide a central source of information and support for the development of commercial partnerships. (7.42)

A strategy for heritage science

- 9.19. Collaboration is crucial to heritage science. There needs to be good communication between university and museum-based scientists in order to draw effectively on the resources of both communities. But at the moment, despite isolated successes, collaboration remains largely *ad hoc*. There is no one within the sector to promote information exchange and support the development of collaborative research projects. In particular, we deplore the fact that there is no body within the United Kingdom taking a strategic overview of research priorities across the field of heritage science. We therefore make the following recommendations. (4.39)
- 9.20. We recommend the development of a comprehensive national strategy for heritage science, embracing both the immovable and moveable heritage, and covering the United Kingdom as a whole. We do not recommend the establishment of a National Conservation Centre at this stage, though this might be needed in the longer term if the sector does not come together as we have recommended. (8.46)
- 9.21. We recommend that English Heritage provide the secretariat to support the development of this national strategy for heritage science. We call on the major heritage organisations in England, and their counterparts in Scotland, Wales and Northern Ireland, along with the universities and the Research Councils, to come together in establishing a steering group to take forward the implementation of this recommendation. (8.47)
- 9.22. We recommend that the newly appointed Chief Scientific Adviser of the Department for Culture, Media and Sport chair and oversee the development of this strategy. (8.48)
- 9.23. We further recommend that the strategy be developed as a “bottom up” strategy, with considerable input from the “users and doers” of heritage science, so that the many institutions that play a part in the heritage sector can share a sense of ownership. (8.49)

9.24. In parallel, as the strategy develops, and research priorities are identified, we recommend that the Research Councils instigate a time-limited directed programme of research, to encourage collaborative projects and build capacity in heritage science. (8.50)

APPENDIX 1: MEMBERS AND DECLARATIONS OF INTEREST

Members:

- Lord Broers
- † Lord Chorley
- Baroness Finlay of Llandaff
- † Baroness Hilton of Eggardon
- Lord Paul
- Baroness Perry of Southwark
- Baroness Platt of Writtle
- † Lord Redesdale
- Baroness Sharp of Guildford (Chairman)
- Lord Sutherland of Houndwood
- Lord Winston

- † Co-opted Members

Declared Interests:

- Lord Broers
Trustee, British Museum
- Lord Chorley
Member and former Chairman of the National Trust
Member of the National Art Collections Trust
Former Board Member of NERC
- Baroness Finlay of Llandaff
None
- Baroness Hiilton of Eggardon
None
- Lord Paul
Chairman and Director of Caparo Group Limited
- Baroness Perry of Southwark
None
- Baroness Platt of Writtle
None
- Lord Redesdale
Secretary to the All-Party Parliamentary Archaeology Group
- Baroness Sharp of Guildford
None
- Lord Sutherland of Houndwood
Trustee of Paxton House, Berwickshire.
- Lord Winston
None

APPENDIX 2: WITNESSES

The following witnesses gave evidence; those marked with * gave oral evidence:

- Arts and Humanities Research Council
- * Professor Tony McEney
- Association of Local Government Archaeological Officers
- University of Bristol
- British Library
- Ms Helen Shenton
- British Museum
- * Dr David Saunders
- * Mr Neil Macgregor
- Building Limes Forum
- Council for British Archaeology
- Crossness Engines Trust
- Department for Culture, Media and Sport
- * Mr David Roe
- * Mr Paul Kirkman
- English Heritage
- * Sir Neil Cossons
- * Mr John Fidler
- Engineering and Physical Sciences Research Council
- * Professor Randal Richards
- Heads of Conservation and Science Laboratories in UK National Museums, Galleries and Libraries
- Heritage Lottery Fund
- * Professor Jacques Heyman
- Historic Royal Palaces
- Mr Richard Hughes
- Institute of Conservation
- * Mr Alastair McCapra
- * Dr David Leigh
- Institute of Conservation Science
- * Dr Joyce Townsend
- Institute of Historic Building Conservation
- * Mr Ian Brocklebank

- Institution of Civil Engineers
- * Dr Bob McWilliam
- Institution of Electrical Engineers
- * Mr David Lammy MP, Minister for Culture, DCMS
 - * Dr Eric May
- Museum Documentation Association
- * Mr Nick Poole
- Museums Association
- Museums Libraries and Archives Councils
- * Mr Chris Batt
 - * Mr Peter Winsor
- The National Archives
- * Ms Nancy Bell
 - * Dr David Thomas
- National Gallery
- National Museums of Science and Industry
- * Ms Hazel Newey
- National Museums Liverpool
- National Museums of Scotland
- * Dr Jim Tate
- National Portrait Gallery
- National Trust
- * Ms Sarah Staniforth
 - * Ms Katie Lithgow
- Natural History Museum
- * Dr Michael Dixon
 - * Professor Richard Lane
- Office of Science and Innovation
- * Ms Judy Britton
 - * Dr Ashley Ibbett
 - * Professor Mark Pollard
- Research Councils UK
- Royal Academy of Engineering
- Professor Cristina Sabbioni
- * Lord Sainsbury of Turville, Minister for Science and Innovation, DTI
- Society for the Protection of Ancient Buildings
- * Mr Ian Pritchett

Tate

- * Dr Leslie Carlyle
- * Mr Alex Beard
- * Professor Norman H Tennent
UK Resource Centre for Women in Science, Engineering and Technology
University College London
- * Professor Malcolm Grant
University of East Anglia
- * Professor Peter Brimblecombe
Victoria and Albert Museum
- Dr Paul Whitmore

The following submitted papers that were not treated as formal evidence:

Dr S Ahmad
Mr Geoff Allen
Cathedral Architects Association
RESCUE
Mr Mark Roberts
Scottish Stone Liaison Group
University of Derby

APPENDIX 3: CALL FOR EVIDENCE

The House of Lords Select Committee on Science and Technology has appointed a Sub-Committee, chaired by Baroness Sharp of Guildford, to examine the role of science, engineering and technology in the conservation of the United Kingdom's cultural heritage.

The inquiry will look at the use of science in monitoring the condition of buildings and objects of cultural importance, at the application of scientific and engineering techniques to conservation, and at the ways science and technology can enhance public understanding of and access to cultural objects.

Conservation science

- How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?
- Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?
- How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?
- Is there a satisfactory process to develop practical applications of conservation research for the market?
- Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

Use of information technology

- In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?
- Is there scope for improving the use that UK galleries, museums and others make of such technology?
- What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

APPENDIX 4: SEMINAR HELD AT HAMPTON COURT PALACE

6 March 2006

Members of the Sub-Committee present were Baroness Sharp of Guildford (Chairman), Lord Broers, Lord Chorley, Baroness Hilton of Eggardon, Lord Paul, Lord Redesdale, Lord Sutherland of Houndwood, along with Professor May Cassar (Specialist Adviser) and Dr Christopher Johnson (Clerk of the Science and Technology Committee).

Participants were Jonathan Ashley-Smith (former Head of Conservation, Victoria and Albert Museum), John Barnes (Historic Royal Palaces), Nancy Bell (Head of Conservation Research, The National Archives), Professor Bill Bordass (William Bordass Associates), Katherine Campbell (Producer, BBC History, WW2 People's War project), Professor David Cope (Director of Parliamentary Office of Science and Technology), Katy Daniel (Engineering and Physical Sciences Research Council), Michael Day (Chief Executive, Historic Royal Palaces), Dr John Fidler (Conservation Director, English Heritage), Kate Frame (Head of Conservation and Collection Care, Historic Royal Palaces), Dr David Leigh (Secretary-General, International Institute for Conservation), Nick Poole (Director, Museum Documentation Association), Dr David Saunders (Head of Conservation, British Museum), Helen Shenton, (Head of Collection Care, British Library), Sarah Staniforth (The National Trust), Dr Joyce Townsend (Chair, Institute for Conservation Science), Dr Heather Viles (University Reader in Geomorphology, Worcester College, Oxford) and Amber Xavier-Rowe (Head of Collections Conservation, English Heritage).

The Committee was welcomed to Hampton Court Palace by Michael Day, Chief Executive of Historic Royal Palaces.

Introduction (Professor May Cassar)

Professor Cassar (Specialist Adviser to the committee) introduced the seminar, highlighting the timeliness of the inquiry, in view of:

- The current lack of long-term assured funding for conservation research;
- The negotiations over the allocation of resources within the 7th European Framework Programme;
- The uncertainty over who within the United Kingdom was championing conservation research;
- The small and ageing skills base;
- The process of implementing the OST review of DCMS.

Research in the museum sector (David Saunders, British Museum)

Dr Saunders noted that science in National Museums and Galleries focused on long-term preservation and elucidation.

Research into preservation was targeted at identifying and preventing deterioration. The monitoring of the effects of past and present conservation practice also informed future practice, as in the case of the monitoring of the effect of ethylene glycol on the Lindow Man.

With regard to elucidation, the study of materials and techniques was essential in establishing authenticity and authorship—for instance, the use of electron microscopes to study polishing marks on real and fake Aztec crystal.

On organisation, Dr Saunders noted that there was no national centre. The centralised model had been rejected in the 1950s–60s in favour of a distributed model. Funding for research within the few National Museums and Galleries that employed scientists was drawn from grant-in-aid from DCMS, and had to compete with other claims in light of DCMS priorities. Grants were available from Research Councils for collaborative projects with university researchers, but the interdisciplinary nature of the field meant that projects tended to fall between Research Council remits. Though there had been some success in securing Framework Programme funding, this was sporadic.

Research in the library and archive sector (Helen Shenton, British Library)

Dr Shenton began by drawing attention to the scale of the library and archive sectors—12,000 libraries and over 2,000 archives, many heavily used by the public. Collections were increasingly in digital format, carrying the risk of total loss. The British Library currently stored 200 terabytes of electronic material.

Research within the sector focused on both traditional organic and digital preservation. Traditional research was less developed than in the museum sector—for instance, an attempt to set up a national deacidification programme had been unsuccessful. Research on digital preservation was a growth area, with its own funding streams (e.g. through JISC).

Both the BL and the National Archives had appointed Heads of Conservation in recent years, and had established an international round-table, funded by the Mellon Foundation. However, research in this area was inevitably applied, not pure science, and would necessarily be distributed among libraries and archives.

The independent and charitable sectors (Sarah Staniforth, National Trust)

Ms Staniforth focused on three areas:

- Public engagement with science: the National Trust cared for many monuments of the history of science, engineering and technology, and attempted to promote public involvement in their conservation and management.
- User-led research: the NT did not have the resources to employ science researchers, so relied on collaborative projects with other institutions, notably universities and Research Councils. This had the advantage for the Trust that outcomes fed directly into its work, and for the universities that researchers were thereby given access to sites and professional conservationists. One example was the EPSRC Engineering Historic Futures project, for which Blickling Hall was a test site.
- Training needs: preventive conservation was fundamental to the sustainability of heritage. More training at degree level would be a great asset, and this could be done either through internships or continuing professional development.

Government-sponsored research for the Historic Environment (John Fidler, English Heritage)

Mr Fidler began by drawing attention to the importance of Parliament itself, as a test-bed for research both into stone preservation and the treatment of death-watch beetle (in Westminster Hall). However, the new approach to conservation of the historic environment was much more wide-ranging, covering landscapes and the marine environment as well as historic buildings.

DCMS had instructed English Heritage to improve the delivery of research in this area, and EH had developed a research strategy (for 2005–2010) accordingly. This proposed a national and European-wide strategy.

The EH budget for research was around £9million a year, of which about £1million went to SET. This research was conducted both by EH staff and in collaboration with other organisations. At the same time, the built heritage was enormously diverse, representing about 6 percent of the total stock of some 25 million buildings. It was impossible to identify total spending on such research nationally, as much spending was within project funding. There was a need for better, centralised data.

Research was highly interdisciplinary, and creating synergies was essential—for instance in establishing the most appropriate use of thatching materials, between planners, property owners, researchers and craftsmen.

In its attempt to develop a UK-wide strategy, EH had signed a concordat with the AHRC, and would hold a seminar in March 2006 to explore cross-sector research funding. Similar issues had been discussed with MEPs, and with colleagues in Sweden, the Netherlands and Ireland.

University-based and international research (Dr Heather Viles, Oxford University)

Dr Viles noted that her research was funded by English Heritage, the EPSRC and NASA. It was cross-cutting research, that could be applied to conservation, but that also had wider application, affecting the work of many Government Departments. University research was driven by the wish to achieve international excellence, measured in large part by the quality of outputs published in peer-reviewed journals.

In terms of funding:

- Universities themselves were good at funding small-scale, “blue skies” research, based on particular scientific disciplines; the heritage sector could be involved more in such research, for instance by providing internships to students.
- End-user funded research tended to be more applied and problem-focused; from the scientific point of view it tended to be more routine.
- Research Council funding, particularly through the EPSRC, encouraged multi-disciplinary projects, involving a range of partners including industry, with the emphasis on cross-cutting research.
- International funding had come primarily through European Framework Programmes. There had been many UK participants in 5th FP projects, and more recently there was an increase in the amount of research coming from Eastern Europe.

In summary, the sum of research was less than the parts. There was high-flying work in small centres, but not enough overall to make the UK a world leader. The challenge was to improve co-ordination and communication, bringing in new disciplines such as micro-electronics and nanotechnology. The international profile of UK conservation science needed to be increased—where were the papers in *Nature* and *Science*?

New technologies for public engagement (Katherine Campbell, BBC)

The BBC was good at creating content, but less good at conserving it for the future—the organisation needed to be aware of its responsibility to conserve its archive, whether on tape or in digital format.

The World War 2 People’s War project, triggered by the 60th anniversary of the end of the war, was a new departure for the BBC in terms of drawing content from the general public, the traditional audience. Engaging a generation of people aged 80 or more had been a major challenge, but involving them in creating data online had itself had a positive effect in showing them the advantages of the internet.

The BBC was now in the process of archiving the data from the People’s War project, extracting the stories and putting them in XML format to ensure long-term public access. It was essential to “future-proof” the data that had been generated. The intention was to use a “friction-free” format, so that people could download information from their own computers, and research it in their own way.

Implementing research (Kate Frame, Head of Collections, Historic Royal Palaces)

Historic Royal Palaces (HRP) was responsible for a wide range of contents, buildings, grounds and archaeological remains. Research was directed at four questions:

- Analysing the condition;
- Finding the right treatment;
- Identifying the risks;
- Piecing together information about the way objects were created.

HRP invested £70,000 per annum in science, funding 1.5 posts. There was considerable collaboration with others in the field. One example was the development of new analytical techniques to monitor the deterioration tapestries, a project which had drawn on European funding. In general information about condition and the analysis of risks was shared relatively widely. Conservation science played a key role in the development of new policies on risk management, for instance on the use of historic buildings for events such as concerts etc.

Another collaborative project, with EU funding, was the monitoring of the sources of dust and its effect on artefacts. Implementing a project of this kind required the support of a wide range of participants, including cleaners, attendants and guides. However, research of this kind was time-consuming, and sustaining both funding and staff continuity was a major challenge.

HRP was engaged in a number of projects directed at analysing the way objects were fabricated—examples at Hampton Court included work on the terracotta roundels and the restoration of the Privy Garden. Such information was key to public engagement.

Discussion (under Chatham House rules)

Discussion focused on a series of key areas.

Research strategy and co-ordination

The Department of Culture, Media and Sport was a small department, with limited resources. It had an arm's length relationship with its non-departmental public bodies (NDPBs), and expected them to develop policies and strategies. In practice NDPBs might also look to the Office of Science and Technology for guidance on developing research strategies.

The problem with the arm's length relationship was that it was very selective—DCMS was ready enough to require socio-economic data from NDPBs in support of its departmental objectives. The Government had a strong emphasis on access, and this shaped the priorities of the sector. The EU also focused heavily on social outcomes. This made it very hard to develop a strategic approach, particularly given that these departmental priorities were passed down to small bodies through funding arrangements. There needed to be an independent voice to speak up for preservation as well as access.

The Research Councils were unlikely to make conservation science a strategic priority. In these circumstances, with no single body charged with developing a national strategy, there was no-one to speak for the interests of the conservation science community. At a recent seminar on the value of heritage, it was clear that in the absence of top-down leadership the managers of heritage found themselves day-to-day making key decisions on the value of heritage and its conservation.

The flow of information was mostly from other disciplines into conservation rather than the other way around—there were occasional spin-offs from a range of subjects, such as medical research. However, this did not seem to be planned.

The bottom-up activity within museums, libraries and galleries meant that certain guiding principles were being developed that could have wider application—but no-one was taking responsibility for this overview. In the UK even data collection was still primitive, and collecting better information would be necessary before one could begin to make international comparisons. In contrast, in the Netherlands as part of the Delta Plan there had been a cross-cutting assessment of the needs of the cultural sector, championed by the Arts Ministry. It had had significant benefits, for instance in terms of developing skills.

There would be no resistance to a national strategy in the UK, as long as it was not imposed from outside—it should be seen as an attempt to co-ordinate existing research. However, there was little support within the museums sector for revisiting the concept of a national centre.

Setting a national strategy would be challenging, given the diversity of the sector. However, there were common risks, technologies and skills. Recognising the shared problems and opportunities across the sector was essential. The Chief Scientist's view was that encouraging departments to set research strategies would increase the chances of discovering such synergies.

Skills

The sector was small, with perhaps 100 practical conservation scientists in total. Around 10–20 students a year studied in the field, but not all stayed in the profession. The total conservation community was of the order of 2,500–3,000 strong. Over half of these worked in the private sector. English Heritage was

working with other Departments and agencies on developing the broader range of craft skills relevant to the built environment, and there were templates which could be applied to the conservation of moveable heritage. However, building-based research had been undermined by the closure of university building science departments and the privatisation of the Building Research Department—skills levels were falling.

There was no established career path within the sector—entry, from either arts or science backgrounds, tended to be serendipitous. The numbers would have to grow to create a clearer career path, but growth would only come in response to a perceived need in the sector. People would move into the sector if there were research grants available; more internships and shadowing opportunities, linking the heritage sector with universities, would also help. A “dating agency”, matching up conservation organisations and universities, would be invaluable.

Underlying these issues was the need to establish more clearly what skills base was needed to maintain the nation’s cultural heritage. At present data were lacking; for instance, the regional basis for support had been dismantled, and no replacement was yet in place. Anecdotal evidence suggested that the level of regional support was falling. The number of private sector conservators, and the amount of day-to-day, ordinary conservation work required, underlined the importance of accreditation schemes, to provide some level of quality control.

The example of the Dutch Delta Plan might in fact be a deterrent to Government: identifying the size of the problem would also reveal the size of the price-tag.

Information Technology

Two aspects of IT were relevant to the field: the use of IT to support the management and conservation of collections and the long-term support for digital records. There was little consistency across the sector, and a lack of leadership. Developing a strategy and providing the long-term support would be very resource-intensive.

The use of IT had helped in meeting access targets in some cases—for instance, at Richmond Castle—particularly for the disabled. However, there was opposition to the idea that IT could replace interaction with real objects, and there was some evidence that once people had experienced objects through IT they were in fact more likely to go to see the real thing. Websites were not surrogates for visits, and science should facilitate long-term access to collections.

On digital archives, there was no clear guidance or best practice, for instance on the preservation of web-based material. For instance, how should archives be formatted? There were many questions, and few answers, and this uncertainty was compounded by the lack of funds, particularly among regional archives.

APPENDIX 5: VISIT TO THE NATIONAL GALLERY

24 April 2006

Present: Baroness Sharp of Guildford (Chairman) and Baroness Hilton of Eggardon. In attendance: Dr Christopher Johnson (Clerk) and Professor May Cassar (Specialist Adviser).

The Committee was welcomed by Dr Ashok Roy, Director of Scientific Research. The first scientific adviser to the National Gallery had been appointed in 1934, at a time when most restorers were contractors, to advise the Director on the safety and reliability of the proposed cleaning of pictures. The technical examination of paintings in advance of conservation treatment had remained a key part of the work of the department, which now employed seven scientists (two part-time).

Other areas of work had developed since 1934, including monitoring of the gallery environment, including air quality and humidity, and imaging of paintings for archival purposes, and for conservation and technical study.

Analysis was largely based on micro-samples of inorganic pigments, organic binders and varnishes often sampled ahead of treatment. This revealed a lot of information both about condition and the history of the materials. Increasingly this information was finding its way into systematic catalogues of the Collection and to exhibition catalogues, along with x-ray images etc. The production of the new series of Schools catalogues was largely privately funded, and without such support might not be feasible. The Scientific Department also produced an annual Technical Bulletin to make available new research results

The Scientific Department had good support from the Gallery management, with an eminent scientist (the Chair of EPSRC) a member of the Board of Trustees and also chair of an external scientific consultative panel. But moving forward the Gallery faced major challenges in replacing expensive equipment—there was no direct funding for this. As for alternative sources of funding, the Gallery was re-applying for analogue status with the AHRC, having failed in its last application; the possibility of applying for analogue status with the EPSRC had only just been raised, and would be explored further.

In terms of organisation, Dr Roy was one of a group of eight senior managers who advised the Director. Such an arrangement was unusual within National Museums and Galleries, where conservation science and conservation were often represented through a “Head of Collections”, in effect a demotion in recent years. Dr Roy felt that it was essential that conservation was represented at the highest management level in museums.

The Committee then heard a presentation from Marika Spring, on pigment analysis and microscopy. She had studied chemistry at degree level, followed by a post-graduate course in painting conservation at the Hamilton Kerr Institute in Cambridge. She illustrated her work by reference to two examples:

- Damaged paint in a canvas by Guido Reni, currently undergoing restoration. Analysis revealed high levels of phosphorus, indicative of damage by bat droppings. The change in the composition of the paint was irreversible, and therefore the damage would have to be touched in.
- Analysis of a Raphael altarpiece of The Virgin and Child revealed a characteristic priming layer of lead white with the addition of lead-tin yellow and ground glass, and an unusual grey tint containing bismuth.

The presence of the same paints in a sample from the Madonna of the Pinks had proved that the painting was early sixteenth century work, not a nineteenth century copy, and, in conjunction with stylistic and historical analysis, led to the conclusion that it was in fact Raphael's original.

The Committee then heard a presentation by Catherine Higgitt, who uses infrared spectroscopy and gas or liquid chromatography to analyse organic compounds, particularly binding agents. Some of the equipment in the laboratory was second-hand, and had been acquired from a range of organisations, including Waitrose and Brunel University, where it had been surplus to requirements.

Finally the Committee met Joe Padfield, and saw the Vasari scanner, designed 13 years earlier for accurate colour measurement and funded by the European Commission as part of a consortium research project. This had 13 colour filters, including three which neared the invisible infrared end of the spectrum. It had been designed originally to monitor long-term colour change; so far, little had been detected in the collection. The department also possessed a seven-year-old, 100 megapixel scanner, which was used for taking accurate large-format images of paintings in restoration. Hewlett Packard had donated large-format printers for experimental use. The Committee also saw another instrument being developed, again with the support of Hewlett Packard, to take images of paintings in multiple raking lights. The relationship with Hewlett Packard would end in about a year's time; no arrangement had yet been reached with an alternative sponsor/collaborator.

APPENDIX 6: VISIT TO ITALY

Members visiting Italy were: Lord Broers, Baroness Hilton of Eggardon, Lord Paul and Baroness Sharp of Guildford (Chairman). In attendance: Professor May Cassar (Specialist Adviser), Jennifer Smookler (Committee Specialist).

2 May 2006

Ara Pacis, Rome, Italy

The Committee was welcomed to the Ara Pacis by Doctress Silvana Rizzo, the Director of the Museum. The Ara Pacis was an altar to Emperor Augustus, around which a specially designed building had recently been constructed. The new building was first proposed in 1995 and opened to the public in April 2006. Its purpose was to protect the monument from environmental damage including urban pollution, noise from the nearby road, and humidity and temperature fluctuations.

Nigel Ryan, an architect working on the project, explained that a great deal of research had been undertaken to identify the right construction technology, particularly because the same “footprint” as the original museum building had to be used in order to avoid disturbing the rich archaeological deposits around the site. Pressure had been applied to compress the soil in order to accommodate the foundations while minimising that vibration and loss that would have been caused by other excavation methods.

The intention was to make the building as transparent as possible to increase the visibility of the monument, while ensuring that the environmental conditions inside the building were regulated. The walls were made of high-performance glass, with the largest panes measured 5m² and weighed 1,000 kg. The glass walls excluded 60 percent of the sun’s thermal energy, while 70 percent of visible light entered the building. The glass roof removed 80 percent of the sun’s thermal energy. The glass was also able to attenuate traffic noise by 47 decibels. The combination of under-floor heating and high-level air conditioning enabled the whole monument to be displayed in a controlled environment.

It had not been the architect’s intention to create a stylistic marriage between the ancient monument and the new building, but rather to give the fullest protection to the monument. The building’s design was intentionally very simple in order to minimise maintenance requirements and to enable the staff to control the environment for the object.

3 May 2006

Consiglio Nazionale delle Ricerche (CNR), Rome

Professor Fabio Pistella welcomed the Committee to CNR (the National Centre for Research) and gave a talk on the mobilisation of research to help conservation. He remarked that the wider value of conservation could be understood not just in terms of the preservation of artefacts, but also in terms of the promotion of the public’s enjoyment and economic benefit. The CNR’s slogan for heritage was “roots of the future”, which took into account the concept of plurality of identities.

The CNR had developed a project management structure in which money was allocated to collaborative projects, rather than schemes involving individual disciplines, and the process of financial allocation was rigorous. A conservation project had to be agreed between the organisation responsible for the heritage object and the organisation with the capability of undertaking the work, but money was not allocated until all variables had been monitored. CNR had concluded agreements with the regions, which had greater responsibility for planning, research and promotion. There were also trilateral agreements involving the CNR, Government Ministries and regions.

Italy's total investment in heritage was 1.2 percent of GDP, compared to the 2 percent European average. However, the most scarce resource in heritage work was not money but personnel, and there were many short-term, temporary positions.

The CNR had 4,500 researchers in its various programmes, with an average age of scientists in the field being 48. Seven percent of researchers were involved in research on cultural identity. The CNR's total budget was €1 billion, half of which came from the Ministry of Research and half of which came from a variety of sources, including the EU (€50 million), competitive bidding, industry, regions and private foundations. CNR ran a total of 80 collaborative projects. It had established a public search engine, which could be searched according to numerous criteria including subject and cost, allowing users access to existing CNR research projects.

The decision to allocate funds was based on a three-stage process informed by—

- the Government's National Research Plan;
- the CNR's Three Year Plan; and
- “market discussion” of supply and demand.

Audits were done ex-post at the national stage by a committee of independent evaluators. Self-assessment was a recent introduction over the last few years.

Professor Pistella suggested that European Union funding had involved too much involvement by the European Commission in project structures. A platform should be created for cultural heritage, which could draw resources from different pots.

Musei Capitolini, Rome

Doctoressa Elena Bianca Digioia welcomed the Committee to the Musei Capitolini. A presentation *in situ* was given on the restoration of Bernini's sculpture of Pope Urban VIII, carved 1635–40, and seventeenth century frescos of Roman mythology. Before restoration, the statue of Pope Urban VIII had darkened due to years of exposure in a polluted environment. Extensive scientific investigative work had taken place before the sculpture was cleaned, including UV and infrared photography in order to discover what was beneath the surface layer of dirt. A private company was contracted to undertake the scientific investigations and conservation work. The conservators did not use solvents, just distilled water and acid free Japanese paper, made of pure cellulose. The Museum maintained the sculpture by dusting it every six month.

Members were also shown the restored gilt bronze sculpture of Emperor Marcus Aurelius, made in 174–176 AD, which had originally stood in the square outside the Capitoline Museum, but which following restoration had been re-located

inside the Museum while a replica had been made for display in the original external location.

By the fifteenth century, the sculpture had already undergone several restorations; Michelangelo then restored it in the sixteenth century; other interventions had taken place in 1912 and again in 1981–84. It had taken three years to analyse the sculpture using x-ray photogrammetry among other techniques before the work on its restoration could start.

International Organization for Conservation of Cultural Heritage (ICCROM), Rome

The Committee was welcomed by Professor Mounir Bouchenaki and other representatives from ICCROM. ICCROM would celebrate its 50th anniversary this year, operating as a specialist inter-governmental organisation made up of 117 member states, including the UK. Its mandate was to promote the conservation of cultural heritage. It aimed to improve the quality of conservation practice and had five areas of activity: its library (including 89,000 entries of conservation literature); research; training; advocacy and co-operation among its worldwide network. Its conservation research group was introduced last year.

There were several problems with research into cultural heritage, including insufficient identification of actual research needs; lack of continuity between research and marketing stages; little or no access to relevant research outputs because of insufficient dissemination mechanisms; duplication of research; lack of scientific literacy from users of research; and a deliberate choice by some scientists to choose projects that would receive funding but did not necessarily reflect the needs in heritage conservation.

Italy did not have a single model for research strategies. Best practice was to apply new research to practical conservation. Best practice principles included: conducting an accurate needs assessment; arranging end-user integration in research and process; assessing stakeholder interests and conducting impact forecasting (preservation of heritage, access to heritage and costs of work); and strategic future planning.

Information technology could be used to improve public access and understanding of cultural property. This was already a reality in many libraries and archives, including innovations such as virtual reality applications, databases, electronic tourism, geographic information systems and digital restoration. However, original documents and artefacts should not be neglected in favour of digital versions.

ICCROM was heavily involved in identifying training needs in different parts of the world. They also organised training, so that trainees could disseminate their skills in their country of origin. ICCROM worked to bridge the gap between scientific institutions and research.

Istituto Centrale per il Restauro (ICR), Rome

The Committee was welcomed by Doctoressa Giovagnoli at Bernini's Fontana dei Quattro Fiumi (Fountain of the Four Rivers) in Piazza Navona, and was told of the proposal to undertake conservation work of the monument. The seventeenth century fountain was made of travertine and consisted of sculptural representations of four major rivers (the Danube, Nile, Ganges and Amazon), with an ancient Egyptian obelisk at the centre.

There were various issues surrounding the proposed conservation work. Governance of the fountain was complicated by the division of responsibilities for the square, its infrastructure and its buildings. Within Government, there was one office that managed obelisks and another office that managed fountains. The conservation of the Bernini fountain therefore required a great deal of cross-departmental discussion. Where there was an exceptional need for intervention by the state, the ICR would become involved as in the case of the Bernini fountain which was a national monument. The Commune of Rome had overall responsibility for the square, including the water supply and lighting systems, but because both were managed by different departments of the Commune of Rome, it was difficult for ICR to discuss changes to either the water supply or the lighting system of the fountain in order to reduce the green staining of the travertine. The need to protect the Bernini fountain from potential terrorist attack had meant that most of the budget had been allocated to this work.

Ministry of Cultural Affairs, Rome

The Committee was welcomed by Director General Aronica and other representatives of the Ministry. They presented an overview of the use of technology in restoration, including new technologies being applied to conservation. The Ministry used a “Risk Map” that had been developed by ICR, which it sponsored. The “Risk Map” outlined the range of potential risks to heritage items, and diagnostic technology was used to profile physical and chemical deterioration.

The Europe-wide policy to promote the use of digital cultural heritage had led to the recent creation of a national digital library that meant that original materials no longer needed to be handled to access information. The collections, which had previously been dispersed throughout Italy, were now a unique source of information. The library contained eight million images and a public access web version was being developed.

Innovations such as virtual imaging would allow cultural heritage to be much more accessible to disabled people. Work was being undertaken on a library of music, which would be a major portal for culture and was due for completion at the end of 2006. Utilising ICT in the archaeological field was a step into the unknown.

The Ministry had five institutes of research: the Istituto Centrale del Restauro (Rome), the Opificio delle Pietre Dure (Florence), the Institute for Pathology of the Book (Rome), the Institute for Cataloguing and Documentation and the Photography Institute. They were separated in function but had a close relationship. Many other organisations were dedicated solely to research, but research in the Ministry was directly related to the conservation of artefacts. The Ministry also shared the research carried out by the CNR.

The Ministry of Culture had jurisdiction over all the major museums in Italy, while the remaining museums were run by municipalities. The state had overall control of the physical protection of heritage and had the final word over the municipalities, but there was also pressure to devolve responsibility. The Ministry had competence over strategy, not territory.

Italy always included protection of cultural heritage in its budgetary plans and also considered heritage as an economic asset. It had identified cultural heritage as one of five priorities and had received considerable levels of funding from EU Framework Programmes for restoration, digitalisation and cataloguing cultural assets.

4 May 2006

The Ghiberti and Pisano Gilt Bronze Doors of the Battistero, Florence

The Committee was welcomed by Professor Cristina Sabbioni (CNR, Bologna), Signor Paola Bianchini (Director, Opera di Santa Maria del Fiore), Dr Mauro Bacci (CNR, Florence) and Dr Andrea Lupi (Technical Expert, Agenzia Regionale Protezione Ambientale Toscana). The Committee was given an overview of the project to monitor the air quality around the fifteenth century bronze doors of the Battistero, and to examine the monitoring equipment. It was explained that the doors on the south side (Ghiberti) and the north side (Pisano) of the building had aged very differently, because of the different environmental conditions to which they were subjected. The Committee also visited the Museo del Duomo where gilt bronze panels from the original door were displayed in controlled microclimates within high performances cases. These pieces had been damaged during the catastrophic Florence flood of 1966 and had been replaced by replicas. The original panels had been cleaned using water, potassium sulphate and laser cleaning undertaken in collaboration with the Institute of Applied Physics.

Laboratori della Sopretendenza, Uffizi, Florence

The Committee was welcomed by Dr Magnolia Scudieri, the Director of the Museo di San Marco. The Committee visited the laboratory where several artefacts were in the process of conservation. Dr Scudieri showed the Committee a fifteenth-century triptych—the laboratory was seeking to find a way to allow the three panels to be joined together, when they had previously been separated and altered in different ways. Institutions from Perugia, Bologna and Florence were collaborating to find a solution.

The laboratory had carried out a range of analyses on the panels, including reflectology, stratigraphic analysis and optical microscopy. These investigations had shown up areas of poor restoration in the past. The current philosophical approach was to reduce interventive techniques as much as possible. The first step was to find out what was original and what was not in the composition of materials.

Dr Scudieri told the Committee that collaboration between organisations was largely *ad hoc* and informal, although she hoped that networks of institutions could be organised. CNR was funded by the Government, but different partners were paid by different Ministries, which made collaboration among them difficult. The number of heritage institutions varied between different regions.

Michelangelo's David, Galleria dell'Accademia, Florence

The Committee was welcomed by Dr Franca Falletti, Director of the Museum, and Dr Alessandro Griffo, Scientific Expert at the Opificio delle Pietre Dure. They explained the heritage significance of Michelangelo's David, and the approach to its cleaning which had been undertaken under the Media spotlight.

Michelangelo's David originally stood in front of the Palazzo delle Signorie in Florence. It had been cleaned in the nineteenth century, using a mild acid solution, which had led to some damage to the statue's surface. A decision to undertake a second restoration was made in 2000 and research begun to evaluate the physical aspect of the statue. Physical, visual and chemical research was also carried out to evaluate the environment surrounding the statue. Sensors were

installed at different heights to profile the temperature, humidity and pollutants around the statue. This revealed that nitrogen oxide levels were higher inside the Museum than outside, because of the lack of reactivity of the inside surfaces of this space to this gas. Most of the tests were non-destructive and limited to a small area. Up to twenty different procedures were carried out prior to cleaning.

The cleaning process was very gentle, using de-ionized water. In some parts, white spirit was used to remove wax deposits. A 3-D image was also produced using laser technology and this research tool had been turned into an interpretative tool next to the statue. It allowed visitors to see hitherto unseen aspects of the statue, such as the top of David's head. The statue has been protected since 2001 by a column of air, forming an environmental "shield" around it.

5 May 2006

Opificio delle Pietre Dure, Florence

The Committee was welcomed by Dr Stefania Agnoletti and shown the Door of Paradise from the Battistero, made between 1425–52. The door included a bronze frame and five gilt bronze panels depicting stories from the Old Testament. Cleaning had taken place in the early twentieth century but following the flood of 1966, new damage had been observed. In 1990 a special conservation studio had been created at the Opificio with mechanical devices to support and manoeuvre the heavy doors. A copy of the door now hung in the Battistero.

Cleaning had to take into account corrosion that had occurred underneath the gilt surface of the panels, to ensure that its removal would not endanger the gilt. Mechanical cleaning using a microscope had been carried out on the door's surface. This was followed by chemical cleaning using Rochelle salts and de-ionized water. A major problem was the need to work with panels that had been detached from the door as well as other panels that were still attached and could not easily be removed. After many trials, the slow but safe technique of laser ablation was undertaken on the panels still *in situ*. Those panels that had already been cleaned were preserved in a nitrogen bubble, so that they would not become dirty before the others were completed.

The Opificio delle Pietre Dure also trained future conservators through traditional apprenticeships. There were three tests for potential students: drawing and the theory of conservation were common to everyone; a third test was tailored to the department in which the student wished to specialise. The length of training was currently four years, although it could become five years to bring it in line with university courses. Each department had about three or four students at any one time.

APPENDIX 7: VISIT TO BLICKLING HALL, NORFOLK

12 May 2006

Present: Baroness Sharp of Guildford (Chairman) and Lord Broers. In attendance: Dr Christopher Johnson (Clerk), Professor May Cassar (Specialist Adviser) and Dr Cathleen Schulte (Committee Specialist).

The Committee was welcomed by Phil Scott, Property Manager at Blickling Hall, and Sarah Staniforth, Historic Properties Director at the National Trust. The Hall was built approximately in a figure “8”, with a lot of external walls. The brick was local, and very sandy and porous. Together, these factors meant that there were constant problems with damp penetrating the walls. In light of climate change, both wetter winters and hotter summers would present significant challenges. The National Trust did not have significant scientific expertise “in-house”, but as a major holder of historic buildings and collections of cultural significance it collaborated actively with a range of external experts, universities and advisers.

The Committee then toured the Hall.

The Brown Drawing Room had suffered from a major flood in July 2002, when a fire hose had burst in the roof space. Water had collected above the 1930s ceiling, which had to be taken down to dry it out and reduce the extensive mould growth. This had revealed a decorated ceiling dating from the 1860s, and following consultation it had been decided not to reinstate the 1930s ceiling. The mould samples had been analysed to identify potential health risks, and the room had been closed to the public for a time while the mould was eradicated.

Dr Chris Calnan, Conservator, introduced a basement Test Site, at which water ingress and its impact on the historical structure was monitored. Moisture was measured at different levels of the outside wall, and analysed by researchers at Glasgow Caledonia University. This was a collaborative project, funded by EPSRC and UKCIP which was led by University College London and which also involved English Heritage.

The Long Gallery housed the Library, which was 125 feet long, with two long external walls. The Library had been affected by the same flood in 2002, which had flooded the ceiling to a depth of 9 inches, requiring it to be propped up temporarily. Those books which had been soaked (around 240) were frozen and then freeze-dried by the British Library. They were now undergoing major conservation work. Infestation by death-watch beetle posed another major threat to the books in the Library.

The Library also housed a second test site for an EC-funded research project, the ‘Master’ project, which was analysing the effectiveness of a novel early warning sensor which measured changes in the environment (e.g. changes in pollutants) by means of a newly developed polymer film. Researchers at UCL were responsible for developing a preventive conservation strategy to provide a framework for interpreting the results with a view to identifying the level of stability required to reduce the decay of organic materials. This research was funded by the European Commission 5th Framework Programme—Blickling was one of 10 European sites involved.

Outside, the Committee viewed the roofs and gutters. The capacity of the gutters was a source of difficulty, as they are now insufficient to cope with major storms. In addition, the growth of moss on the roofs led to blockages. However, a balance

had to be struck between the interests of building and nature conservation—the range of lichens and moss growing on the building was of considerable interest to naturalists.

The Committee then visited the Textile Conservation Studio, which, in addition to working for the Trust, also now took on work from other organisations such as the Victoria and Albert Museum. The Studio had analytical work carried out by the Southampton University Textile Conservation Centre, which was applying for funding for a project to examine the stresses on handling textiles, using fibre-optic threads. The Studio, along with Blickling and Hardwick Hall, was being offered as a test site.

For major, sophisticated microscopic analysis the Studio would go to the Institute of Archaeology at UCL, with which the Trust had a contract. However, much of the work was small-scale, and finding collaborators was more difficult. The sector was not very well organised in this respect.

APPENDIX 8: VISIT TO DOWN HOUSE

15 May 2006

Present: Baroness Sharp of Guildford (Chairman) and Lord Broers. In attendance: Dr Christopher Johnson (Clerk), Professor May Cassar (Specialist Adviser) and Dr Cathleen Schulte (Committee Specialist).

The Committee was welcomed by Amber Xavier-Rowe, Head of Collections Conservation at English Heritage. She noted that English Heritage was responsible for some 500,000 objects spread over 132 sites, ranging from archives and natural history specimens to the scientific collection at Down House. The House had around 20,000 visitors a year.

Within Darwin House most of the contents were returned by the Darwin family after it became a museum in 1927. A few natural history samples were on loan from the Natural History Museum (where much of the Darwin collection was held, other parts being in Cambridge), but the emphasis in the house was on Darwin's family life.

The Committee then toured the house, guided by David Thickett, Senior Conservation Scientist.

In the Dining Room Mr Thickett highlighted the difficulty in controlling relative humidity in historic houses. In winter, modern heating leads to low, damaging relative humidities. Conservation heating, using a relative humidity sensor rather than a temperature sensor, was used. The system has a maximum temperature to prevent excessive heating in summer. There were issues of relative humidity gradients because of the door to the corridor (which had conventional heating). The object was to maintain a steady level of humidity, but high humidity in turn created problems with pests, such as silverfish and woolly bears. The former grazed on wallpapers, and the latter ate textiles. The windows in the dining room had UV filters.

The Study contained many of the most important and challenging objects in the collection. The challenge was particularly difficult because the small room was a such a major attraction for visitors. Humidity inside the prints on the wall was monitored; light levels were kept low by keeping one of the blinds closed.

In the Drawing Room the furniture was almost all original. Dust was the key problem, and conservation cleaning represented about 25 percent of English Heritages total expenditure on collections care. A collaborative project, involving the University of East Anglia, the National Trust and Historic Royal Palaces, had developed a prototype box for measuring both the amount and types of dust deposit. These could be measured daily, and correlations with numbers of visitors established. In Down House most dust was brought in by visitors, either as dust from the gravel outside or fibres of clothing. This project had been funded by the Leverhulme Trust, but English Heritage was currently applying for a further tranche of funding from the Leverhulme and the BBSRC.

Lighting in the Drawing Room was mostly natural, and annual readings on particular items were taken using a colorimeter to measure fading.

On the first floor, the display cases had experienced corrosion problems because of acetic (ethanoic) and formic (methanoic) acid fumes given off by the wood, as well as difficulties in managing humidity and heat levels. The use of silica gels to

control humidity was being trialled. The rooms on the first floor used conventional comfort heating rather than conservation heating.

The Committee also visited the Store Room, where Darwin's original notebooks were kept. These were being photographed so that digital images could be made available.

The Committee was then shown around the garden by Toby Beasley. One of the problems in the garden was the fact that Darwin like to have the house clothed with creepers, and research into the impact of these upon buildings was being conducted. Elsewhere, some of Darwin's simple experiments illustrating the effects of natural selection were being replicated.

APPENDIX 9: VISIT TO NATIONAL MUSEUMS LIVERPOOL

9 June 2006

Present: Baroness Sharp of Guildford (Chairman), Baroness Finlay of Llandaff, Baroness Perry of Southwark, Lord Sutherland of Houndwood, Professor May Cassar (Specialist Adviser), Christopher Johnson (Clerk).

The Committee was welcomed by John Millard, Keeper of the World Museum Liverpool, who drew attention to the current re-organisation of the Museum's management, and to the re-opening following extensive refurbishment of the Conservation Centre on 12 June. He noted that the Museum's location in Liverpool meant that, unlike the London museums, most visitors were not tourists, but came from the northwest region. Techniques used to conserve the Museum's collections spanned traditional crafts and cutting edge technologies—this meant that the Museum had to collaborate with other organisations (including other National Museums) and where necessary contract out work. In particular, the Museum was working increasingly with the Sector Skills Councils.

Sculpture Conservation

The Committee toured the 10-year-old sculpture studio, which had been constructed to handle large items such as public sculpture, in a variety of materials including bronze and stone. The techniques and technologies for conservation, recording and interpretation used in the studio (principally laser cleaning and laser scanning) had been introduced by the museum, but developed further with the assistance of grants from the DTI's Public Sector Research Exploitation Fund (PSRE). Of the 12 staff, only two were funded by DCMS grant-in-aid (including the Head of the Sculpture Conservation Department); six were funded by PSRE grants, for which bids were required every two years, and the rest from contract work.

The Department had an active consultancy role, helping local councils to conserve public monuments, war memorials and architectural decorations in public spaces, using laser treatment. About half of the heritage material in the studio came from the Museum itself; the rest was being treated under contract.

Laser Scanning Technology

Christopher Dean described the wide range of work under the name of Conservation Technologies that was carried out for third parties, in particular laser scanning technology, which captured 3-D images of sculpture. The equipment had cost over £500,000, and had to be exploited commercially to pay its way. The scanned images of objects could be used to assist in the production of exact or scaled copies in the original material or in a range of other materials such as nylon. The technique could also be used to detect fragments of original colour on surfaces. These fragments of colour could then be used to assist in interpretation of the object by visitors and scholars. Scanned images could also be used to re-create 3-D images on screen, which could then be handled in a tactile way using haptic technology and a robotic arm developed by MIT. These techniques had a range of potential uses, particularly educational.

Though part of the Museum, the status of the studio, which also operated commercially, was currently under review. There were private sector competitors, mostly small companies in the UK, Europe or the United States. However, the

Liverpool sculpture studio was unique in bringing together such a range of expertise and technology.

Laser cleaning technology

The Committee then turned to laser cleaning technology, which the studio had developed for a range of contexts, including use outside, for instance on architectural decorative sculpture which had to be conserved *in situ* (e.g. relief panels on St George's Hall). The technology had been developed in collaboration with the CCLRC Laboratory at Daresbury, with funding from the Leverhulme Trust. English Heritage now increasingly recommended laser cleaning for at-risk objects on buildings, in advance of restoration. There were around half a dozen private companies providing such services.

The Museum offered training courses on laser cleaning and laser scanning, partly to promote awareness of the technologies, which remained patchy. Most of those attending such courses were conservators. The object was to familiarise conservators with the opportunities and know how of these technologies in order to understand when it would be appropriate to commission laser scanning or laser cleaning. This should ultimately generate more business for the Museum—though many potential customers, including heritage institutions, did not have the resources to pay full commercial rates.

Conservation Science Laboratory

The Committee then visited the Conservation Science Laboratory, in the company of Siobhan Watts and Sonia Jones. The development of improved monitoring (now a key DCMS performance measure) was as much a priority as conservation treatments. Monitoring of the various museum sites was now networked through remote telemetric systems, allowing rapid diagnosis of environmental problems as they emerged.

The Committee then discussed the situation in regional museums with Velson Horie, Keeper of Conservation at the Manchester Museum, University of Manchester. With conservation not ring-fenced within museum budgets, he believed that core funding was being diverted from conservation to promote public access programmes. As a result museums increasingly relied on outside contractors who did not necessarily have access to the best science, to undertake conservation work. While some museums did good work, there was no consistency and no resource provision to promote collaboration. There was a need for more regional centres of excellence.

The Institute for Conservation was best placed to take the professional accreditation scheme forward, and had received funding from the Heritage Lottery Fund for the development of professional skills. However, private sector conservators in particular needed access to centres of excellence to maintain standards of conservation science.

The Committee also visited the Textile Conservation Studio, the Organics Conservation Studio and the Paintings Conservation Studio.

APPENDIX 10: LIST OF ACRONYMS AND ABBREVIATIONS

AHRC	Arts and Humanities Research Council
BBSRC	Biological and Biotechnology Research Council
BL	British Library
BM	British Museum
CCLRC	Central Laboratory of the Research Councils
CPD	Continuing Professional Development
CSA	Chief Scientific Adviser
DCLG	Department for Communities and Local Government
DCMS	Department for Culture, Media and Sport
Defra	Department for Environment, Food and Rural Affairs
DTI	Department of Trade and Industry
EH	English Heritage
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
FP	European Union Framework Programme
GDP	Gross Domestic Product
HLF	Heritage Lottery Fund
HRP	Historic Royal Palaces
Icon	Institute of Conservation
ICS	Institute of Conservation Science
ICT	Information and Communications Technologies
IHBC	Institute of Historic Building Conservation
JISC	Joint Information Systems Committee
MDA	Museum Documentation Association
MLA	Museums, Libraries and Archives Council
NA	National Archives
NAO	National Audit Office
nCRISP	New Construction Research and Innovation Strategy Panel
NDPB	Non-Departmental Public Body
NERC	Natural Environment Research Council
NHM	Natural History Museum
NMGs	National Museums and Galleries
OSI	Office of Science and Innovation (formerly OST, the Office of Science and Technology)
PSA	Public Service Agreement

PSRE	Public Sector Research Exploitation
RAE	Research Assessment Exercise
RCUK	Research Councils UK
SET	Science, Engineering and Technology
SPAB	Society for the Protection of Ancient Buildings
UCL	University College London
UEA	University of East Anglia
V&A	Victoria and Albert Museum

Minutes of Evidence

TAKEN BEFORE THE SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY
(SUB-COMMITTEE II)

TUESDAY 14 MARCH 2006

Present	Chorley, L	Platt of Writtle, B
	Finlay of Llandaff, B	Redesdale, L
	Hilton of Eggardon, B	Sharp of Guildford, B (Chairman)
	Paul, L	Sutherland of Houndwood, L
	Perry of Southwark, B	

Memorandum by the Department for Culture, Media and Sport

INTRODUCTION

This memorandum has been submitted by the Department for Culture and Sport. It includes inputs from English Heritage, the Museums, Libraries and Archives Council (MLA), the British Library, the V&A, Tate, National Museums of Science and Industry, the Natural History Museum, National Museums Liverpool, as well as DCMS. It aims to provide the committee with general background information to inform its inquiry into the role of Science, Engineering and Technology in the conservation of the United Kingdom's Cultural Heritage. The note also includes information on the specific points highlighted by the committee on issues it wishes to address. Input from the National Museums of Scotland has been submitted separately.

DEFINITIONS

The Government's Chief Scientific Adviser (CSA) has recently set up a rolling programme of reviews to assess the quality and use of science by government departments. The term conservation science covers several distinct areas of work: the technical examination of objects and works of art; testing the materials used for display and storage; research into new methods and materials for use in conservation; health and safety; and conservation science in training centres. For the purposes of this review, science is used in its broadest definition. This memorandum will adhere to the Committee's definition of looking at how science is used in monitoring the condition of buildings and objects of cultural importance, at the application of scientific and engineering techniques to conservation, and at the ways, science and technology can enhance public understanding of, and access to cultural objects.

BACKGROUND

The Office of Science and Technology recently released their report reviewing science within DCMS: the CSA's Programme: Rolling Reviews of Departmental Science. The review identified areas in which DCMS can continue to improve its use of science. DCMS will in due course appoint a senior part-time Chief Scientific Adviser. The post holder will be a scientist, whose role will be to ensure that the science needs of DCMS (including considerations of science and heritage) are strategically addressed and that science and scientific advice form an effective part of the evidence base for policy-making and delivery, dealing both with substance and processes. The department, however, does not see itself having a major direct role in the provision of advice on scientific matters or as the home of scientific expertise. It believes it is more efficient for decisions on what conservation or IT skills and resources are required should be delegated to the experts in the bodies it sponsors and the wider cultural sector.

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CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

1.1 Conservation science is carried out at many different levels in a variety of institution types, including conservation laboratories in museums, libraries, archives and heritage agencies, as well as higher education teaching and research institutions. There are very few establishments throughout the world dedicated to conservation research, and the number of individuals whose work is solely related to conservation science is relatively small. In the UK, this activity is concentrated in the large national collections and some university departments. In most cases, the conservation scientists support the work of the conservation team but their role varies depending on the type of institution and the nature of the collections. Government tends to be involved only at arms length from direct engagement in conservation science research, for example through the museums and galleries that it sponsors.

1.2 The main body co-ordinating collection management issues for natural science collections is the Natural Sciences Collections Association (NatSCA). This group meets annually and represents natural scientists and natural science conservators. There is also a small informal group of natural science conservators that provides co-ordination, providing training and focus for further development.

1.3 On an international level research and analytical results in conservation science are disseminated through peer-reviewed publications from two organisations: The International Institute for Conservation of Historic and Artistic Works (IIC) and the International Council of Museums Committee for Conservation (ICOM-CC). At present there is no central co-ordinating body on a national or international level although the Institute of Conservation Science (ICS) is a recently formed professional group established by practitioners to address the lack of overall co-ordination in heritage science.

1.4 DCMS does not itself take part in these co-ordinating bodies, but its sponsored bodies are active in them. For example, one of Tate's Conservation Scientists is currently Chair of the Institute of Conservation Science.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

2.1 It is difficult to identify the total amount of funding that goes towards conservation science each year other than through grants made by the research funding councils.

2.2 Core funding for many national museums provides basic staff and facilities. A conservation scientist within a museum can have an extremely broad remit, with a range of materials and types of collection and responsibility for aspects of preventive conservation. In a survey carried out by the Museums and Galleries Commission (MGC) in 1998 (*Museum Focus*, (2) 1999, MGC) there were 33 posts working in the field of conservation science in museums, libraries, archives and related organisations in the UK (Many of which were directly sponsored by DCMS, such as the British Museum, English Heritage, Historic Royal Palaces Trust, Royal Armouries, Tate Gallery, National Museums and Galleries Merseyside, and National Gallery).

2.3 Undoubtedly there are those who think more resources should be made available for conservation research, and for promoting the skills of the next generation of conservators. Training is available in science and conservation but there is no specific course for conservation science. A minimum qualification is a first degree in science and a post-graduate degree related to a conservation project. Considerable resources are already put into areas of fine and applied arts, and in aspects of archaeological conservation, with more focus on the preservation of the built heritage and the contents of historic houses and greater emphasis on creating the right environment for the storage and display of historic collections. However, there is also room for improvement. There is also felt to be a need for more trained conservators specialising in industrial, scientific and technological collections. Specialist conservators are required to address the specific requirements and needs of specialist areas such as conservation of photographic collections. And looking to the future, electronic media conservation is likely to be an increasingly important area of work. However, the Department feels it is important that decisions about how to deploy resources to conservation and other specialist areas are best taken by those with expert knowledge running museums and other institutions. It is therefore for those bodies sponsored by DCMS to make the decisions about how best to spend the available funding for conservation on areas of greatest need and priority.

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How does the UK compare with other countries in the application of cutting edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

3.1 The UK has been a world leader in the field of preventive conservation. There is no one national centre for conservation research, funded by Government, unlike in some other countries. However, several of the bodies sponsored directly by Government are leaders in the field.

3.2 Victoria and Albert Museum (V&A), through funding from the Frameworks initiatives of the EU, has produced an innovative pollution dosimeter, and is presently using a light dosimeter (marketed under the name of Lightcheck) to establish techniques for the condition survey of paper-based collections. Other projects being developed by the V&A include developing ways to look at innovative techniques for assessing textile collection conditions, and the development and implementation of radio-telemetric systems for data collection.

3.3 Tate is currently investigating a plan to further cutting-edge science and technology in the service of our cultural heritage. The study of the materials and techniques used in a work of art (technical art history) is an emerging field, which impacts on both the preservation and interpretation of art works. Tate is planning to build a centre for the study and conservation of its collection (The Collections Centre). This could incorporate at its heart an analytical facility to be shared by other museums/galleries/conservation training programmes nationally and internationally. By grouping advanced core instrumentation in one facility designed specifically for conservation science it will be possible to carry out both innovative research and routine analysis at the highest level, contributing to the advancement of technical art history, conservation treatments, and preservation innovations in the UK and worldwide.

3.4 National Museums Liverpool acts as a regional resource centre for local museums, art galleries and heritage sites.

Is there a satisfactory process to develop practical applications of conservation research for the market?

4.1 Conservation is a relatively small field; conservation research is even smaller. This small scale limits the capacity for developing wider applications of conservation research.

4.2 There are however a number of areas where technologies have broader application: the use of the laser for cleaning stone; new materials for consolidating artefacts; or work on the environment that objects are displayed or stored in.

4.3 There are several mechanisms that have helped bring techniques to wider use. Public Sector Research Establishment (PSRE) grant has helped to fund the development of museum-based technology (laser cleaning and scanning and replication) within National Museums Liverpool (NML) sculpture conservation department. This funding allowed the museums to develop the equipment for use on the museums collection (improving best practise) but also allowed the museums to use this technology outside the museum (offering a museum quality service) and is now generating income for the museum.

4.4 Other successful developments include the EU funded research project to develop light dosimeters and the development by the V&A and a commercial partner of a network-based environmental monitoring system. The latter project inevitably resulted in a product designed primarily for a large London museum, which has been difficult to adapt elsewhere without comparable staff resources.

4.5 Although some companies have tried to develop and market materials and products for conservation, it is quite rare for them to be profitable. Even working with industry, for instance on developing adhesives for use in conservation, has not necessarily proved successful for museums. It is usually easier to adapt industrial methods and materials for the purpose.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology and the part they play in our cultural heritage?

5.1 There is scope for enhancing public engagement with science by educating them about conservation. The conservation of historic artefacts can be used to practically illustrate the changes that take place in materials, how this affects their appearance and properties and what the attempts to slow down the change are. This type of engagement has been used particularly successfully in museums that deal with archaeology and art, but is also found in science and technology museums.

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5.2 The Conservation Centre at the National Museum of Liverpool has been actively involved and successful in this form of public engagement since it opened in 1997, for example, through public lectures and tours of the conservation departments. The sculpture conservation department and laser technology section (Conservation Technologies) have been working on larger external contracts such as public monuments. Public debate and publicity generated (through local radio, papers and TV) has helped engage a wider circle of the public than those that visit museums, promoting the benefits of conservation to the population and environment at large. The science of museum objects forms the basis of an innovative new permanent exhibition *Reveal* at the Conservation Centre, due to open in Spring 2006. This exhibition demonstrates how scientific techniques are used to find out about and conserve our cultural heritage, and there will be a working laboratory at the centre of the exhibition.

5.3 The V&A's conservation science team has an active programme of engagement with the public. Typical examples are continued participation in the Royal Society of Chemistry initiative "Chemistry at Work" events (involving hundreds of school children), V&A based gallery talks, summer school activities and participation in the British Association science activities. Each event brings positive feedback stating that the public want more.

5.4 Tate's new Collections Centre with its analytical research facility would engage fully with public access allowing visitors to see the full range of scientific and technological instrumentation being used to push the boundaries of our knowledge about the works in our cultural collections.

5.5 The Darwin Centre at the Natural History Museum aims to enhance the public's engagement with and understand the natural sciences. The design of the building, interactive exhibits, live presentations by science and conservation staff have provided a unique experience for the public. The NHM work in partnership with other museums and private companies developing a range of scientific and conservation innovations, including the British Library, Tate, the V&A, Imperial College London and Cambridge Ultrasonics.

5.6 Finally, the National Railway Museum in York have a viewing gallery, where visitors can see how vehicles are returned to working order.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

6.1 DCMS believes that IT can greatly enhance access to and engagement with cultural materials. When the Minister for Culture, David Lammy, launched a new Digitisation Action Plan for Europe during the UK Presidency last year, he spoke of the importance of cultural organisations, large and small, making their collections available in a digital form for everyone to see and re-use creatively.

6.2 UK cultural institutions have been at the forefront of efforts to digitise their collections and make them available online in innovative ways. As far back as the early 1990s, the National Gallery recognised the importance and effectiveness of digitisation when it set up its online gallery. There, a visitor touches a computer screen and has access to all the paintings in the Gallery. This was pioneering work at the time and the concept is now widely used. It is also strongly focused on the needs of the user.

6.3 Clearly this leads to greater public access to material that is not usually on display or is too fragile to put on display. *Turning the Pages* is a recent example. This is an award-winning interactive program developed by the British Library that gives members of the public access to precious books while keeping the originals safely under glass. *Turning the Pages* allows visitors virtually to "turn" the pages of manuscripts in a realistic way, using digital technology and interactive animation. They can zoom in on the high-quality digitised images and read or listen to notes explaining the significance of each page. This is available at a touch-screen in the John Ritblat Gallery.

6.4 The production of engaging IT resources by cultural organisations requires an understanding of what users want. The Department's £16 million Culture Online programme was established in 2002 with this in mind. It commissions projects that extend the reach of arts and culture to new audiences using new technology; it specialises in engaging hard-to-reach audiences. Culture Online has a world-class team of specialists drawn from industry, and has a proven track-record in its field.

6.5 While the imaginative use of digital technology can unlock resources held by the cultural organisations without compromising their conservation, it is important to note that the preservation of those digital resources can be problematic. Digital content can be lost because of the rapid succession and obsolescence of

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computer hardware and software, and the limited lifetime of storage devices. A number of UK organisations and groups are working in this area, particularly the British Library, the Digital Preservation Coalition and the Digital Curation Centre.

6.6 High quality online cultural resources can also help to extend the reach of new technologies into society, build IT skills, boost the digital economy and close the digital divide. Recent research shows that our museums, libraries and archives already have a reputation for producing web-sites that can be trusted by users [MORI: February 2005].

Is there scope for improving the use that UK galleries, museums and others make of such technology?

7.1 It is quite clear that technology and user expectations are changing rapidly and that there will always be scope for improving the uses made of new technology. Cultural organisations need to be aware of developments in related areas, for example, education, computer games, and user-generated trends like blogs.

7.2 By bringing together the creative, technical and educational communities, the National Endowment for Science, Technology and the Arts (NESTA) Futurelab is one organisation helping to transform the way people learn. NESTA uses new and emerging technologies to create rich learning resources that are involving, interactive and imaginative (www.nestafuturelab.org). NESTA has also produced a report entitled “Learning with Digital Technologies in Museums, Science Centres and Galleries”.

7.3 The NESTA report looks at the challenges provided by the growth of digital technologies, asks what is distinctive about learning in museums, science centres and galleries, and questions how this might change through the increasing use of digital technology. It asserts that museums’ long-divorced twin functions of scholarship and education are now being reunited by a wide variety of digital technologies that both accelerate learning and permit activities that would not otherwise be possible. The report stresses that museums have an important role to play in facilitating lifelong learning, with an emphasis on learning from objects (rather than about objects) and on strategies for discovering information (rather than the information itself). It concludes that a new set of relationships is emerging between objects, learners and digital technology, in which museums are, above all, places of exploration and discovery.

7.4 It is important for our museums, archives and libraries to achieve a greater critical mass of material online for people to use. In the UK, the Museums, Libraries and Archives Council (MLA) is chairing a public-sector wide group to unlock public sector content, which includes DfES, Bringing Educational Creativity to All (BECTA), British Library, BBC and many others. Plans for the “Creative Archive”, led by the BBC, Channel 4, BFI and the Open University, concentrating on moving image material, are consistent with this approach.

7.5 Some of this work is taking place in a European context. Our cultural organisations have limited resources for digitising their collections and it is important that we co-ordinate digitisation programmes and policies at a European level, and devise good practice to deliver better value for money and more effective services. Efforts to co-ordinate the digitisation of the cultural heritage across Europe began in 2001, when experts from a number of Member States met at Lund in Sweden and produced an action plan. A National Representatives Group has been established, and meets at least every six months. Activities carried out include identifying and comparing digitisation practices, setting technical standards across Europe and developing best practice guidelines. The new Dynamic Action Plan for the EU co-ordination of digitisation of cultural and scientific content, launched in November 2005, is the latest outcome. The European Commission are also working on plans for a European Digital Library.

7.6 The MLA has developed its “Knowledge Web” which will provide new links between collections and help to select the material that is most relevant to the needs of a particular user—that fits their learning style, is relevant to where they live, and builds upon their existing knowledge. As the NESTA report highlights, digital technologies favour personalisation, whereby the learner can use appropriate technologies to provide a dedicated and personal mentor.

7.7 Beyond the world of galleries and museums, efforts are being directed towards technology that describes performances for visually impaired people. In particular, we are aware of a proposal to establish local or regional hubs in which theatres can share equipment, technicians and training facilities to enable people with visual and auditory disabilities to enjoy productions.

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What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

8.1 There are numerous examples of how the use of IT improves access to and understanding of cultural objects in the UK and abroad. Some examples are below:

CULTURE ONLINE

8.2 “Every Object Tells a Story” is led by the V&A in partnership with Channel 4, Ultralab and three regional museums, the project focuses on the art of storytelling. The site uses the personal meanings and histories behind objects to get people to look at them in new ways, inspiring them to create their own stories and share their interpretations and objects of personal significance with a growing online community. Video, audio, text and pictures combine on the site to offer an accessible route into the content.

8.3 “My Art Space” is an interactive service that enables visitors to museums and galleries to “collect” cultural artefacts with their mobile phones, create their own online collections and share their interest, knowledge and enthusiasm about the objects and art works they find. The service partners include the D-Day Museum in Portsmouth, Urbis in Manchester and the Study Gallery in Poole. The service, specifically designed around museum education, illustrates how the digital world of websites and mobile phone technologies can add value to the real world of museums, galleries and exhibitions.

8.4 “The Portable Antiquities Scheme” is the largest community archaeology project ever developed in the UK, with a network of 37 finds liaison officers across England, working with over 5,000 finders. The project website is used to record information about the 50,000 objects reported to the Scheme each year, many found by people who use metal detectors. The website makes all this information available and reaches over 1,000 users every week. To emphasise the personal nature of the site, it enables people to trace objects that have been found near where they live.

8.5 “Luxonline” is a free comprehensive online resource for people wishing to learn about and explore British-based artists’ film and video art. Considered to be an exemplar of how the internet can be used to energise interest in historic work, Luxonline has received funding from Arts Council England and the New Opportunities Fund. It is an ongoing project, with artists continuing to be added to its virtual archive.

8.6 The Poetry Library magazines archive is a free access site to a full text digital library of 20th and 21st century English poetry magazines from the Poetry Library Collection housed in the South Bank Centre. The archive is part of an ongoing digitisation project at the Library funded by Arts Council England.

NATIONAL AND REGIONAL MUSEUMS

8.7 Our national and regional museums and galleries are also using IT to improve access and understanding. Some examples of recent work are below.

8.8 Tate Online is developed in partnership with BT and attracted 5.5 million website visits in 2004–05. Independent analysts consistently rate it the UK’s most popular visual arts, and museum website. All of the collection and archive material is available online. Tate Online won the Hollis award for the best on-going sponsorship and the site was short-listed for two international “Webbys” awards, under the Arts and Cultural Institutions sections.

8.9 The focus of the current Imperial War Museum digitisation programme is the Second World War and post-war reconstruction. The Collections Division will be digitising a broad range of Second World War material that will contribute to the various elements of the “Their Past Your Future” programme.

8.10 The National Portrait Gallery’s website contains a search facility with 64,720 portraits from the Gallery’s collections, 43,628 of which are illustrated. It is possible to search the collection by groups, subjects and themes, to view an illustrated timeline and hundreds of documents from the Heinz Archive and Library.

8.11 The National Gallery’s website provides access to the entire National Gallery permanent collection and long-term loans. The website received nearly 5.5 million hits in 2004–05. The National Gallery’s digital/multimedia facilities have received considerable recognition over the past year. Other innovative projects such as “Zooming Pictures”, and “Art Start” have won awards for excellence in the use of technology.

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8.12 The British Museum website contains details of current exhibitions, access to the COMPASS online collection, information for schools and young people and a series of sections devoted to the various cultures of the ancient world. The number of visitors to the Museum website has increased markedly in recent years. There were 7,565,805 visitors to the site in 2004–05, as compared with 4,491,000 in 2001–02.

8.13 The British Library set up the “Collect Britain” website with New Opportunities Fund (NOF) funding which contains over 90,000 images and sounds from the British Library. It offers specially selected collections, themed tours and virtual exhibitions: “Turning the Pages”, the BL’s award-winning (eg Yahoo awards) and innovative digitised collection of some of its treasures such as the Lindisfarne Gospels and the original manuscript for Alice in Wonderland; International Dunhuang Project, which brings together in digital form an internationally important collection of rare Buddhist material from China held in several national museums and libraries.

REGIONAL PROJECTS

8.14 In 2004, Tiverton Museum of Mid Devon Life launched its online learning resource “Virtual Victorians”. The website uses artefacts, photographs and archive material from the museum collection, and explores life in Victorian times through the daily lives of the Poslett family. The “Then and Now” photographs look back at Tiverton and the surrounding villages over the last 100 years. The website has won several awards and is being used by schools across the country.

8.15 The 24 Hour Museum is a good example of a collaborative project. Created in 1999, this is the UK’s national virtual museum, with stories including arts and museum news as well as exhibition notices, reviews, features and trails. It aims to encourage visitors to go to real attractions around the country and show them activities all over the UK. The site promotes publicly-funded UK museums, galleries, archives and heritage attractions and seeks to get the message about Britain’s culture to a broad online audience nationally and worldwide.

Examination of Witnesses

Witnesses: MR PAUL KIRKMAN, Head of Museums and Cultural Property Division, and MR DAVID ROE, Acting Director of Modernisation, Department for Culture, Media and Sport; and Ms JUDY BRITTON, Director of Science in Government Directorate, and DR ASHLEY IBBETT, Head of EU R&D Policy, International Directorate, Office of Science and Technology; examined.

Q1 Chairman: Good morning and welcome. This is the very first meeting of this Committee and we are delighted to have you here and we are delighted to have members of the general public here as well. On the seats, there are available for you notes of the interests, amongst other things, of members of this Committee. Would you like to start by introducing yourselves and, if there are any particular points that you would like to make before we move into questions? Dr Ibbett, perhaps you would like to start?

Dr Ibbett: Thank you very much. Good morning. My name is Ashley Ibbett and I am a Deputy Director in the Office of Science and Technology, where I have responsibility for the Framework Programme—the current Framework Programme and the negotiation of Framework Programme 7.

Ms Britton: I am Judy Britton. I am a Joint Director of Science in Government Directorate, which is also in OST, and I have oversight of the Science Review Programme, including the science review of DCMS, and various other things associated with Sir David King’s responsibilities as the Government’s Chief Scientific Adviser.

Mr Kirkman: Hello. I am Paul Kirkman. I am the Head of Museums, Libraries and Cultural Property at the Department for Culture, Media and Sport.

Mr Roe: Good morning. My name is David Roe and I am a Director at DCMS. My responsibilities are for strategy, and that includes, relevant to the Committee’s interests today I think, both the DCMS research programme and also the implementation of the OST Review of Science in the DCMS.

Q2 Chairman: Thank you very much. Is there anything that any of you would like to say by way of general introductory remarks, or would you like to go straight into questions?

Dr Ibbett: No, thank you.

Q3 Chairman: I would like to kick off, if I may, and can I start by referring to the strategic aims of the DCMS, which are set out on page vi of the OST Review: “to improve the quality of life for all through cultural and sporting activities, support the pursuit of excellence and champion the tourism, creative and leisure industries.” I think one of the issues that we

have been concerned about is that central to both the quality of life of people in this country and to the leisure industries is the whole issue of our cultural heritage and the sustainability of that cultural heritage. Central to the sustainability is the question of conservation and conservation science. The OST Review of the DCMS points out that responsibility for and interest in science relevant to DCMS's policy sectors is shared across a number of government departments and cites ODPM and Defra as examples. However, the memorandum which you submitted from DCMS did not mention either of those two departments or any other department and we wondered why that was so? Clearly co-ordination between government departments is an extremely important issue?

Mr Kirkman: The ODPM and Defra are mentioned specifically because they are departments which have a particular interest in English Heritage and, in fact, English Heritage's funding agreement is co-signed by those two departments. I think that is in recognition of the contribution that English Heritage makes to the delivery of their aims and targets, particularly in relation to the statutory responsibilities around the planning process. English Heritage is one of our biggest NDPBs and it is the Government's statutory adviser on the historic environment. It gets about £130 million a year of grant in aid and spends about £10 million a year of that on research. More generally, we do recognise that our NDPBs can contribute to the agendas of other departments, not just in the science area; the educational agenda of DfES is one and the Home Office also. In relation to this particular memorandum to the Committee, it seemed to us that no other departments had a particularly large interest in conservation science, which was the main subject of the memorandum to the Committee.

Q4 Chairman: Yes, I think we would agree with that. We did note that actually quite a lot of the evidence that you gave us came from some of the evidence that had been submitted by the Museums and Libraries Association and also from the National Museums Liverpool. Clearly, you found that relevant. I wonder whether there is any particular reason why you should have quoted those in particular?

Mr Kirkman: It is a reflection, I think, of the fact that we do not have a strong, direct role in conservation science in the Department, and largely that is delegated down to the bodies that we sponsor, so the museums and English Heritage, and so on. We made use of the expertise that is available to us in those sponsored bodies in replying to the questions that the Committee asked, as we do not have a big, central repository of knowledge on those subjects in the Department.

Q5 Lord Redesdale: I know DCMS delegates a lot of roles to English Heritage and in *A Force for Our Future* it delegated a whole lot more, so much so that English Heritage have stated that they do not feel they have enough money to meet all their commitments. Do you feel that the sorts of funding difficulties that English Heritage is facing to meet its statutory obligations means that it does not have enough to properly fund conservation science?

Mr Kirkman: I would not say that, no. Inevitably, there is a process which goes on between the bottom-up demands of the organisations that we sponsor and the funding that they want to carry out the full role of their statutory responsibilities, or their responsibilities and interests and the pressure and constraints under which we operate. The way we try to work is to delegate what seems, in the round, looking at both those bottom-up pressures and the resources available, the most reasonable amount to each organisation, looking at them all across the piece, and then give a fair amount of managerial delegation and responsibility to the chief executives and leaders of those organisations to manage those resources and deliver their statutory and other responsibilities within them.

Q6 Lord Redesdale: Taking that just a little further, does that mean English Heritage, whose budget is under pressure at the moment, then would have to make up its own mind about which areas it was going to give its scarce resources to, and there is no ring-fencing of conservation science?

Mr Kirkman: There is not ring-fencing of conservation science, no. Like many other things, it will be under pressure, I guess, if they feel that their budget is under pressure, but that is not the same thing as saying that is the thing that will go. Our view is that the leadership of that organisation are in a better position to make the decisions about those allocations of resources between things at more of a level of detail than we are; they know more about those subjects for which we have charged them with the responsibility for making those decisions. Clearly, we need to be aware of any issues and problems and concerns that people raise and they will be fed into the relationship with the organisation, but managerial responsibility and responsibility for allocating budgets in that way is with them, largely.

Q7 Baroness Finlay of Llandaff: I was wondering how much communication there is between your department and the relevant departments in the devolved administrations and how much communication and information-sharing occurs, particularly over conservation science, and whether you are requesting that English Heritage does communicate and share information with organisations such as Cadw?

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Mr Kirkman: We have regular contact from time to time with our opposite numbers in Scotland and Wales, in particular, at departmental level. I have to be honest, I do not sponsor English Heritage and I do not know what their relationship is with the other bodies in Scotland and Wales. I would imagine that they have similar regular contacts, but if you like I can look into that and get back to you with the details of what contacts they do have.

Q8 Lord Chorley: Do you have contact with the private sector, or do you leave that to English Heritage, or others?

Mr Kirkman: As a department; about what subjects in particular?

Q9 Lord Chorley: An obvious bit of the private sector would be the National Trust, for example, but it might be any of the great houses which have collections and have buildings?

Mr Kirkman: We do have some contact from time to time but I do not think we have a systematic arrangement.

Q10 Lord Chorley: It is not a systematic connection?

Mr Kirkman: No, I think probably it would be fair to say. We do not have a system in place of speaking to all the private owners of big heritage properties on a systematic basis, no; it is more that we will have contact as issues arise.

Q11 Chairman: Can I push you a little bit further here, because insofar as DCMS sees itself as the champion of the tourism, creative and leisure industries, it is all very well having this arm's-length relationship, but is not the great danger that every institution will go its own way? Some sort of strategic direction is required and does DCMS not play any part in this?

Mr Roe: Thank you, My Lord Chairman. To say just a little bit about our strategic priorities, which is something you mentioned a moment ago, clearly one of the main strategic priorities for the department, which are in our Five-Year Plan and various other documents, relates to participation in sporting and cultural activities, which include, of course, museums and heritage sites. We are interested particularly in participation by priority groups in society. Also we are identifying as one of our key priorities productivity and the growth of the tourism, sport and leisure industries. Really just to give the Committee a bit of context, when it comes to thinking about science, the area that the department is probably most interested in is social science, so we are very keen to improve that evidence base in terms of social research and economic research. I mention that really just to give you some background. Having said that, as a department at the hub, if you like, of our

sponsored bodies, the key way that we try to achieve our priorities is through funding agreements, so with each of the museums and with English Heritage, as with the Arts Council or Sport England or Visit Britain, we have a funding agreement. When we draw up the funding agreements, one of the big questions in our mind is whether the priorities of the organisation reflect the department's priorities, so there is a mechanism there for ensuring some congruence. Having said that, we recognise also that there is an imperfect match between our objectives and those of some of our NDPBs; for example, as we have already discussed, because they have interests in other departments' priorities, they get funding from other sources and they have statutory duties which go beyond our priorities. It is for that reason that the funding agreements do not look just at things which are the department's priorities; on the one hand, we make sure they do help us with our objectives of access, and so on, but also we are interested in how effectively they deliver science, where science is an important part of what they do. For example, we would expect that, when it is finalised, the new funding agreement with the Natural History Museum, which is one of the two most important organisations for science in our area, would have targets for things like the amount of research they produce, whether it is peer-reviewed and the quality, and so on.

Q12 Chairman: My impression is that you do not do that with most museums. I think one of the difficulties with the targets you are setting at the moment is that essentially you are looking at things like access, and so forth, and this is giving priority to short-term issues rather than the longer-term sustainability. The sustainability of our cultural heritage is vitally important if we are both to meet our sustainability target—we did not inherit the earth, we hold it in trust for our successors, and so forth—and, of course, preserving it for ourselves. In fact I think it is also proving to be a very useful way of encouraging people to take an interest in science.

Mr Kirkman: I do not think we would accept that we are; by setting a series of priorities that is not the same as saying that we rule the other things out of court and say people should not do them at all. Most of the national museums are set up with statutory responsibilities, which stress very much the collection and the conservation of the collection, and that is the absolute bedrock from which all of those museums start and operate. It is a matter of the highest concern to us, the collection.

Q13 Chairman: I am glad to hear it.

Mr Kirkman: Debates with the museums often will centre around issues of collection conservation. Usually, typically, they will be about capital projects

needed for stores, and that kind of thing, rather than conservation science, which is something they have not seen us having as much use for or the ability to contribute to.

Q14 Lord Redesdale: I am interested in this whole aspect of priorities, because surely a museum, if it is to ask for money from the department or try to access funds from the department, is going to cut and tailor its proposals around your priorities. Has not that been the case with access over the last few years, that access was the big priority of DCMS so an enormous amount of resources from the museums' budgets has been diverted into what is one of DCMS's prime priorities?

Mr Roe: My experience is that the bodies we are talking about are very independent and they have their own minds and sense of their mission, which clearly involves providing continuity for future generations as well as delivering on the department's other priorities. Really I cannot stress too highly that, in the funding agreement, yes, we do expect that bodies will help to deliver the objectives of the Government in exchange for the grant in aid that we give them, but we tailor each funding agreement to the needs of the organisation. As I say, in the case of English Heritage and the Natural History Museum, which I think, by quite a long way, are the most important of our bodies for these purposes, there is a reflection of the whole range of what they do.

Mr Kirkman: I think we recognise that the objectives of the museums are not a subset of those priorities that we have and that they have wider statutory responsibilities. We have encouraged them, in drawing up the funding agreements between us, to stress the wider contribution they make to public value, both of the government departments' agendas and I guess their own agendas, and we have encouraged them also to agree a set of targets with us which go beyond—I am sorry, let me go back a step. We have a set of core targets which we apply to all the museums and they do concentrate on access and efficiency, it would be fair to say. We are conscious that does not capture the full sense of what those organisations are about and what they do and we encourage them to write into the agreements with us a more balanced score-card approach which has a wider range of measures covering the full range of things that they do. In the case of the Natural History Museum, I have got it in front of me here, they cover stewardship, access, scholarship and research and business access, excellence and efficiency, are the four headings. We have tried to make those the same, or similar, to the measures that the management of the Museum use themselves to drive the performance of the Museum.

Q15 Lord Sutherland of Houndwood: I wanted to pursue this a bit further. I was going to pick it up later but since it has surfaced now this is the moment. How does it work, the relationship between you and your various bodies that you sponsor or are lead department for; how does it work, for example, in relation to the public expenditure review? Do you have a sort of notional figure and, as you were implying, after the review is complete that is your budget and you distribute it? If you are bidding for funds, what is the involvement of some of these museums, for example, or English Heritage; are there formal meetings, is it built into your procedures that you sit down and discuss with them, or do they simply have to take what they get?

Mr Roe: I think I would answer that, first of all, by saying that every spending round is a bit different from the one before. Certainly it is the case, and I was involved in the previous spending review and will be involved in the next one, that we consult with the key sponsored bodies quite early on. So we are already, for the Comprehensive Spending Review that is getting underway now, in discussion with the chief executives or directors of the key strategic bodies and some of the other bodies, to start working out what collectively we can say as part of the discussion which goes on within government about priorities for the future.

Q16 Lord Sutherland of Houndwood: Actually you do discuss with the relevant boards or accounting officers, or what have you, and there is a programme laid out. In your estimation, does that work well, are your customers content with how it works, they are never content with the money, that is not what I am asking, they always want more money, but with the process, do they feel that they have been well represented, because it is a very disparate group of organisations you deal with?

Mr Roe: Yes, I believe they do think they have been well represented. I think sometimes it is not terribly easy to disentangle people's dissatisfaction with the result from their impression of the process. Whilst recognising that we can continue to learn and improve in the way we consult and negotiate, I would say that it has been fairly satisfactory to date.

Mr Kirkman: Certainly, from our point of view, we do not do that just as a stakeholder management exercise, it is not just to keep our clients happy. At the moment, the place the spending review is at is looking at past evidence and trying to gather that and has good use been made of public money over the previous years. Frankly, the only way we can do that is with the full co-operation of the bodies themselves, because they tell a much better story about what they have done. If you wanted to know what great things had been done with the Museum, ask Nick Skelton or

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Ian McGregor and they could say it much better than ever I could.

Q17 Lord Sutherland of Houndwood: One of your bodies, or at least the Board, was pretty discontented, a year or so ago, the British Library; has that been resolved, or is there a better process in place?

Mr Kirkman: The British Library had some concerns about whether DCMS was the best place for them to be sponsored because they see themselves, in very large part, as a research resource, for understandable reasons, that is a big part of what they do, as well as being a cultural entity, and repository of all the knowledge and literature, and whatever, of the nation. We went through a process of reviewing possible alternative models and we have ended up with something a little bit like the English Heritage situation, where now we have got a joint steering group, involving us, OST, DfES and the Research Councils, which meets several times a year, and the funding agreement is signed off jointly by ministers of the three departments.

Q18 Lord Sutherland of Houndwood: May I declare an interest, that I was involved a bit in the British Library scene and in the discussions there. I suppose the question which really I want to put is, it seemed to come as a bit of a surprise to both sides that they were not walking the same path; if this is so, did you take steps to look at the relationship you have with the other bodies with which you deal, such as English Heritage and the museums?

Mr Kirkman: The answer is, we have not done that systematically, we treated that more as a one-off. There are very specific circumstances about what the British Library are and what they do which led to that review, and it has not been something that we have generalised across all our bodies, no.

Q19 Chairman: Do you have any dealings, on this specific issue, with the National Archives, who are sponsored, I believe, by DCA; do you have any dealings with DCA and talk to them about it?

Mr Kirkman: We have some contact, or I have, with the archive themselves, rather than with DCA.

Q20 Chairman: What I would like to do now though is bring in OST and ask you about what steps DCMS and OST are taking to oversee the development of conservation science, funded by the department's NDPBs. I believe these now are analogue partners within the Research Council process, with projects funded by the Research Councils and from other sources, such as private foundations and, for that matter, by the EC Framework Programme. This demonstrates some co-ordination between DCMS and OST. How much takes place? How far are you working closely together on these sorts of things?

Ms Britton: Perhaps I could speak on the Research Councils. This is not an area of my responsibility so if you have follow-up questions I will take them away, but hopefully I can give you the general picture. OST has responsibility for the vitality and standing of the UK research base as a whole and particularly for ensuring that the science budget, via the activities of the Research Councils, continues to support a wide portfolio of high quality, basic, strategic and applied research in higher education institutions and Research Council owned and sponsored institutes and centres. As you were saying, this may also include what they call "academic analogues" which are able to bid for grants and I think it is relevant to the inquiry that these include some museums. Whilst OST sets the overall strategic objectives and priorities for the science budget, consistent with the Government's wider priorities, rather like, I suppose, DCMS does in their area, again Research Councils are independent bodies and they do prioritise within their own particular areas. What happened is that the allocation for the spending round 2004 settlement was made by the Director General of the Research Councils on the basis of the individual Research Councils' delivery plans. They put forward their proposals in these delivery plans and he looks at that and allocates the money on that basis, but conservation science was not an issue which was raised for particular discussion. OST does have oversight of Research Council business through a new performance management system, and that requires a clear framework of outputs and outcomes. These do not tend to be based on particular streams of work but are sort of more general targets and milestones for things like interdisciplinary research, the amount of the responsive money that goes to individuals, the amount that goes to teams, the number of citations, and so on. Really it is looking rather more at the effectiveness and efficiency of how the Research Councils are divvying-up their resource, but for the Research Councils it is quite an important principle that they do have that freedom to respond to the best bids that are put in and distribute the money on that basis. Again, we are quite arm's length from the process in a particular stream of work like conservation science.

Q21 Chairman: Who has responsibility for co-ordination between the research undertaken in museums and that undertaken by Research Councils; is there any co-ordination here or any thought of co-ordination?

Ms Britton: I am not aware of that, and again this is something I am not an expert in, but when I was looking through the AHRC delivery plan I did notice that one of their key deliverables is establishing integrated research support for museums and

galleries, and that is something you might want to ask them more about. I am just pointing that out. That rather suggests that is something they see a need for rather than something that is established.

Chairman: I think the great danger, and it arises both with DCMS and with OST, is that a small area like conservation science, which actually does bridge a lot of areas, just falls between the cracks, that approaches are too fragmented and there is no co-ordination and no overall vision of the way in which it is being developed.

Q22 Baroness Platt of Writtle: How does DCMS go about monitoring the quality of the scientific outputs of its NDPBs? You have mentioned social science and economics but it must include hard science as well?

Mr Kirkman: You are right; the main interest is social science but there is some hard science. The main bits of that are in English Heritage, as we have mentioned already, and the other body that we sponsor as a significant hard science area is the Natural History Museum. Largely, the way we manage our relationships with the sponsored bodies is through the funding agreements, which we have described already, but, as I said, they are not massively directed about the kinds of inputs that the bodies have to put into the things that they have to do, they are more about outputs and outcomes that we want them to achieve. In the case of English Heritage though, there was a quinquennial review in 2002 and one of the things that we tasked English Heritage to do then was to come up with a research strategy that would link their research better to the organisation's overall strategic objectives and to make sure that linked more closely to departmental priorities, including the *Heritage Protection Review*. This is the thing that was published in 2005, which I think maybe the Committee will have seen; it addresses some of the important issues for the historic environment, like climate change, natural erosion, changes in farming practices, economic change in urban and rural areas, labour and skills shortages and social exclusion. The implementation of that research strategy is embedded into the funding agreement so, in effect, we have required them to review what they are doing, come up with a new strategy and put into the funding agreement that they are going to deliver on this strategy that they have devised. We monitor the funding agreement then on a six-monthly basis, and there is an interdepartmental group which does that, which involves DCMS, the Office of the Deputy Prime Minister, Defra and the Treasury. Roughly speaking, it is done in that kind of way, through the funding agreement process.

Q23 Baroness Platt of Writtle: In the OST report, there is quite a lot of mention of horizon-scanning. When you are talking about hard science, horizon-scanning is rather important and, of course, as you have just mentioned, climate change?

Mr Kirkman: I think David has been doing the horizon-scanning work.

Mr Roe: Yes, I have been doing some work on looking at long-term issues for our sectors. I think, probably, in that context, in the context of the department's interests, some of the main issues that we would be interested in would be economic and social trends, demographic change, to some extent environmental changes and changes in technology. Again, it is an agenda for the department which is focused to quite a large extent, but not exclusively, on social science issues.

Q24 Baroness Platt of Writtle: What about hard science, the developments, which could mean that conservation is helped?

Mr Roe: I am sure that is right but, at the level of the department's interests, that is not something we would have expertise in or knowledge about particularly.

Q25 Chairman: There are two questions really which arise from your answer. One is this business of setting targets and funding agreements. You have indicated already, in your earlier evidence, that the priorities here have lain very much with looking at access and efficiency, and stewardship is beginning to play a part. I take on board your point that it is the social sciences which interest you. Certainly if you are looking at this whole question of access, productivity and efficiency you are bringing in the social sciences. The fact remains that conservation science pulls in all the hard sciences. What you have done with English Heritage, saying "We want to see a research strategy," is the first step towards using research to develop a longer-term strategy. Why only the built heritage, why not the moveable heritage, MLA, and so forth? Are you going to ask for research strategies more widely?

Mr Kirkman: Certainly, in the past, the MLA have had a research strategy. The place where they are at the moment is in the middle of going through a reorganisation which involves merging a series of different regional organisations and a national organisation into one. The plan is, when the new organisation is in place, to do a new research strategy for the unified organisation. I think the point will still remain about how big a part scientific research is likely to play in that; probably it will still likely focus on social science issues. I think they are the ones that the organisation is likely to find of the most interest.

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Q26 Chairman: Can you give us some illustrations of what are the particular problems in social science that you see for the museums and galleries, and so forth?

Mr Kirkman: I think it is stuff around what the impact and the point of museums are to society more broadly, so what role museums have in education and how museums can be used best in education, what educational impacts they can have and how they complement other methods of giving education.

Q27 Chairman: This is written frequently into their mission statements?

Mr Kirkman: Yes, but in practice is it where museums can really make the most difference in education and how they go about doing that. I think another one is around the whole agenda of respect, community cohesion, community-building and what role museums can have in defining identities for communities and helping build in senses of identity. A third one that people are often interested in is the economic benefits of museums.

Chairman: If I might put it to you, these are all relatively short-term objectives, they are fulfilling the Government's short-term objectives at the moment. The sustainability issue of conservation is a longer-term one.

Q28 Lord Sutherland of Houndwood: I will just follow through on this one. Supposing English Heritage or some of the museums, as a central part of their strategy, come up with the whole stewardship issue, how does that resolve, in relation to the strategic priorities that you have been enunciating, access and efficiency?

Mr Kirkman: What I know the most about probably is museums and it goes back to starting from a model of what a museum is. A museum is an organisation which uses collections to do things, it uses collections to educate people, it uses collections to build a sense of identity and place and it produces individual well-being and enjoyment for individuals who like going there, and it has spill-over economic benefits for tourism, and things like that. The fundamental USP, the thing that is different and unique about it is the fact that it has a collection and uses that to do it, and does it therefore in a kind of very real and engaging, interactive kind of way. The way it plays into that is, if the museum comes to us and says "Our collection is no longer fit for purpose for doing the job that we're doing," we will take that absolutely seriously, because it seems to me that is the bedrock on which those things are built. Similar things could be said about the built heritage as well, I think. Typically, and we do have those kinds of conversations with them quite often, as I said, they are more often about capital projects for storage. I think it seems to the museums that we can add more value by helping

them with storage problems, consolidating storage, doing joint storage between various museums, just straightforwardly funding some sort of new, capital project, rather than taking a view on conservation science, where, to be blunt about it, we do not have expertise.

Q29 Lord Sutherland of Houndwood: You have given your definition of what a museum is, and you say that to museums, do they agree, or do they say "Actually, we think looking after the collections is really rather important, as part of our heritage, and that means conservation is a central part of what we are"?

Mr Kirkman: No, they do not say that. Increasingly, they are very much taken by the need to demonstrate relevance to the public. A report which might be interesting background for the Committee was one which was published last year, I think, by the Museums Association, called *Collections for the Future*, which was sort of setting the agenda for thinking about the collections and their use in the museums community. It is focused very much on the idea that a collection is there and has value only insofar as it is used and shown to be for communicating with people and putting audiences at the centre of what museums do as much as collections, and collections being there as a tool for serving audiences.

Q30 Lord Sutherland of Houndwood: That would not be anything to do with the fact that is how the money comes, would it?

Mr Kirkman: I do not think it is, no, because the Museums Association is the trade body of museums, not just the government-funded ones, the ones across the piece. It is funny you mention this because I had a discussion about exactly this subject with quite a range of museum people yesterday, where they were very strongly in that audience and community engagement place rather than the collection preservation place. In fact, some of them responded quite negatively to the use of the word "preservation" and insisted I must use the word "conservation" because it is more outward-looking and positive and proactive.

Q31 Baroness Finlay of Llandaff: Can I ask a question, following on from that and the previous question that you had, which is about the relationship between the science output of non-departmental public bodies and the Government's broader science and innovation strategy. I am thinking particularly towards the harder end of science, the translation into practice of chemical and electro-imaging techniques, and so on, and the development of research questions for which our museum heritage and broader heritage provide the

raw material to answer such questions, which is a long way away from the social science issues that you have been addressing just now with Lord Sutherland?

Mr Roe: Can I say one word about that and then perhaps Judy will follow up, from the OST point of view. I think certainly it is the case that we would expect our bodies, and particularly those bodies which engage in science, to have a wide range of contacts in all relevant areas. We are talking about government, Research Councils and the academic world, and that is what scientists do and we expect them to continue doing it. Probably there is not a leading role for the Government in facilitating that kind of contact, because I think it happens already and we are not aware that there are any particular difficulties or barriers to constructive engagement with the wider community. It is always worth remembering, I think, that typically our bodies are working as part of a very wide network, so they do not deal just with government or with other DCMS bodies but right across the private sector, the voluntary sector, the academic world, and so on.

Ms Britton: I think probably mine is a sort of more general comment. I would say that the relationship with the science and innovation agenda is the same for DCMS's NDPBs as it would be for any publicly-funded body. Science and research should be fit for the purpose for which it is intended and carried out efficiently, and for bodies which do a significant amount of research that should be set out in a research strategy so you can see that they are evaluating it and working to their priorities. It should be monitored and peer-reviewed for quality but in a proportionate way, obviously depending on how much they spend. It should also be disseminated, and I think this is the important thing, wherever possible, to ensure it brings wider benefit. That might be through private commercial exploitation, it might be, in a sense, for the health of the country, for the good of people or for other research. It is knowledge transfer in different kinds of ways really, through publications, conferences, and so on, which often encompass the wide range of people whom David was speaking about. It is a clear government policy; the responsibility for that does rest with the NDPBs themselves. I think what we would say is that, as the sponsor body, DCMS would want to be alerted by the NDPBs if there were significant problems with fulfilling this wider government policy, and of course that would be most important during the funding agreement discussions that we were talking about earlier. The idea is that dissemination is important, obviously you do the research for the purpose for which actually you are doing it, but having done that then you pause and say "How do we get maximum value out of this public expenditure?" and therefore it is very important to disseminate it in the most effective way.

Chairman: Yes, I think our museums are actually very good at disseminating a lot of this information.

Q32 Baroness Finlay of Llandaff: I have a short supplementary, which is not to decry the dissemination at all, but you can get scientific advances which eventually lead on to other things, including commercial developments, and so on, which therefore may not be disseminated very quickly whilst such developments are in play. I would like to have some reassurance from you that those scientists who are working really at full front, ground-breaking areas are not going to be penalised inadvertently for not being nearer the social science agenda end of any strategy?

Ms Britton: I am not sure about the social science bit. I was going to say that a very large part of the agenda for government is using the science and research proactively, if possible. A lot of that is through knowledge transfer, moving it out into the commercial sectors and indeed in educating and training up academics, those working in NDPBs, and so on, so that they can take part in that transfer of the knowledge, because often it resides in the person as much as the piece of paper, so a lot of work is going into knowledge transfer across all publicly-funded research.

Mr Kirkman: I know that the Natural History Museum does have a consultancy business which involves using its scientific expertise for those practical purposes. They do forensic work, environmental management type work, I forget all the details but certainly there is knowledge transfer going on there in a quite practical way.

Q33 Baroness Hilton of Eggardon: I am just expressing personal puzzlement that you keep referring only to the Natural History Museum, not to the British Museum or the Science Museum or the V&A, and I do not quite understand why it is only the Natural History Museum that seems to be your responsibility? I probably ought to know but I do not.

Mr Kirkman: It is not that it is the only one which is our responsibility but they do a lot more scientific research than any of the other museums; that is the only reason.

Q34 Baroness Hilton of Eggardon: Presumably, there is a conservation department in the V&A and the British Museum?

Mr Kirkman: There is, but I was talking not just about conservation science, I was talking about science more generally. Conservation science is a very small bit, in aggregate, of what all the museums do for us. Taxonomic and other biological research is a very big part of what the Natural History Museum does. It was simply that point.

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Q35 Baroness Hilton of Eggardon: You referred very specifically to English Heritage and the Natural History Museum as your major concerns. Surely English Heritage is no more scientific, in that sense, than others?

Mr Kirkman: English Heritage does specific research into the scientific aspects of the built heritage and archaeology and similar things, so therefore has that chunk of scientific work, and the Natural History Museum has a quite different chunk of hard science, which is basically taxonomic biology. The others have very small bits of conservation science, just the odd person, here and there. Really it was just the fact that they are the institutions which have a critical mass of scientific research going on within the institutions.

Q36 Lord Paul: Partly we have talked about this earlier, but what steps is DCMS taking to ensure co-ordination between the various NDPBs and exchange of knowledge and expertise on areas of common interest; can you spell it out for us?

Mr Roe: I think possibly we have touched already on the role of scientists particularly in networking and exchanging knowledge in areas of common interest and expertise. Our position, I think, in the department, is that we do not see there is a particular problem to be addressed there, but if there were difficulties then we would need to be aware of them. On the social research side, if you are interested in that aspect, we do have some specific examples of how we promote co-ordination. One would be the new National Household Survey (“Taking Part”), which we have just launched, which goes into nearly 30,000 households and asks questions about how different population sectors use their leisure time, a particularly interesting question for us in a time of great social change and demographic change. Culture is changing, becoming richer and more diverse and we are very interested in knowing how people in different groups choose to spend their time. One reason why I have singled that out as a good example of collaboration is that this is a project which is led by the department and also it involves the Arts Council, Sport England, the MLA and English Heritage, and we collaborate on it also with museums, with the Department for Education, the Department of Health, and so on. That is an example, I think, of where, looking at a really high level, strategic issue for the department, which is increasing participation, we have a dynamic role in bringing people together. There are other examples, in the area of sustainable development, for example, which is clearly an aspect of broader science, where we have a group called the Sustainable Development Forum, where we work together with our NDPBs in developing policy and practical solutions to issues. We have another research network where all the

social researchers and economists that are around our DCMS family can come together to share ideas. I think the point of that is, yes, we do that because I think that for social research we can add some specific value, as a catalyst, as a leader, which is a slightly different category from our approach to natural science.

Q37 Lord Redesdale: I take the point you made earlier about conservation rather than preservation but there is a core area where preservation obviously is very important. I am just wondering, we talked about ring-fencing and you said there was not any ring-fencing, but then, if there is no ring-fencing, how do you make sure that there is enough money in the pot for essential scientific work? There has been evidence given to us that there is a lack of people working in the field, people are moving outside into the private sector and within a few years we are going to have a real lack of a knowledge base in the scientific areas of conservation.

Mr Kirkman: Again, I think it comes down to the people we sponsor being given objectives and things they need to achieve; they need to figure out what the tools are that they need to achieve those things and go and find them, and those will be resources of the kind that you describe. Hopefully, that incentive structure should feed through and make the people who run the organisations, who need those services, find them, buy them. Hopefully, also the system will work that it will feed back to us, if it is becoming a critical problem, that they cannot secure the resources they need to do the job they need to get done. At the moment, that has not fed back. I am not getting a strong message from the museums that conservation science, or a crisis in it, is one of the critical problems they are facing.

Q38 Lord Redesdale: We have had evidence that the amount of money being spent on science is being cut over the years and therefore they are losing jobs in the area. At what point could that feedback come back, because if you have got a smaller base in conservation departments, and it seems the first one to be cut, is there a mechanism for people actually to say, “This is a problem”?

Mr Kirkman: I think the mechanism is through the funding arrangements we have with the bodies. The people who run those organisations would not be shy of telling us if they thought they could not do their jobs because of whatever it is, whether it is conservation science or the ability to buy new paintings, or crumbling buildings, or whatever, they do come and let us know about those things.

Q39 Baroness Perry of Southwark: You mentioned earlier that you had actually requested English Heritage to publish their research strategy. Do you

have plans to encourage such strategies to be prepared by your other NDPBs?

Mr Kirkman: I do not think it is something that we have required; as I said, the Museums, Libraries and Archives Council certainly are planning to do one. I know that, as part of the process of applying for research analogue status with the AHRC, the museums have been through that process. One of the critical things in getting that was drawing up a proper research strategy, so certainly it is something they have all been working on. At the moment, we have not decided on a plan to ask them to publish them all, and I could not say how many have, to be honest, at this stage.

Q40 Baroness Perry of Southwark: We noticed that English Heritage introduced its strategy by saying that it was a catalyst for debate on the need for and the shape of a UK-wide research strategy for the historic environment and went on to say that they wanted to bring about a co-ordinated approach to research across this sector. What is DCMS's response to that?

Mr Roe: I think we welcome it. Neither of us representing the department is particularly the expert on English Heritage, but from my point of view any work which our NDPBs do to expand their influence and work with other people working in the same sector would seem to be, on the face of it, very positive.

Q41 Baroness Perry of Southwark: Do you think the MLA similarly should be looking to produce a co-ordinated strategy across the moveable heritage sector?

Mr Kirkman: I think it is a matter of responding to need. As I understand it, there has not been felt to be, by the people involved, a great need for a mechanism to co-ordinate the work. As I understand it, from speaking to people, there is a fair amount of co-ordination going on at grass-roots level, of conferences and similar structures, which allow people to work together in constructive ways. If that is working, I think our point of view would be, we do not want to establish a structure to do something which may well be happening anyway.

Q42 Baroness Perry of Southwark: I would agree with that but, as you rightly said, your form of words was, it may be happening anyway and do you have any way of checking that this desirable outcome in fact is being realised?

Mr Kirkman: I think partly provoked by the Committee, I certainly did some asking of the MLA and people connected to that world and I did not get a sense that there were people crying out for central co-ordination.

Ms Britton: When we did the DCMS review, we talked to the NDPBs and sent out a questionnaire to them, and about half of them reported that they did have their own research strategies and they were theirs, it was not something that they engaged in with DCMS, it was something they carried out in their own right. Of those that did have science or research strategies, three-quarters of them said that they engaged with others in formulating those strategies, with other government departments, academia, professional bodies, and so on. Whilst DCMS does not play a role necessarily in facilitating that, actually they do that because that is part of their business, as it were.

Q43 Baroness Perry of Southwark: That still leaves quite a large amount of the sector that does not have a research strategy and does not report any co-ordination, does it not?

Ms Britton: Yes. I think it would depend. Obviously, the 70-odd bodies, I am not sure which of them would require a research strategy and which would not. I think we are quite heartened that actually half of them have them.

Q44 Baroness Perry of Southwark: I think what we are looking for in our questions is, in government, who is seeking to keep an eye on the ball to make sure that all the good things are happening, that the research is going on, that there are proper outcomes from research, the quality of the research is of the right standard, that there is the right form of co-ordination between all the various people who are doing research, and so on? I think this is what we are looking for.

Mr Kirkman: I think our answer would be, in general terms, that there is a market for this research in that there are customers for it, which are the institutions which are responsible for the built or moveable heritage. On the face of it, they seem to be satisfied with the service that they are getting and if they were not that would feed back through the funding arrangements we have with them, which stress their need to get certain jobs done and deliver certain outputs and outcomes and, insofar as they cannot do that, what the things are that are stopping them doing it. As I say, they come to us with various things which they say are stopping them doing their jobs and which are problems and barriers and hurdles, but, to date, conservation science has not been one of those key things that they have been saying is a barrier to getting their jobs done. I think that is what leads us to believe that kind of decentralised and market-type approach is working satisfactorily.

Q45 Chairman: As you realise, we are right at the beginning of our inquiry. We have had a certain amount of written evidence that we have been

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reading our way through and one of the things which does come out from that is indeed the fragmentation of this area. Also we are very conscious that conservation science has been an area where Britain has excelled in the past, that those who participate in it are ageing and that there is not perhaps much prospect of renewal. We cannot see, at government level, that there is anybody at the moment who is worrying about it or taking a lead role. It is this role of leadership that we have been probing you for, and I have to confess that, on the whole, you have been pushing it back to decentralised level. Fine, perhaps somebody in government does need to be worrying a little bit about this. Clearly, in relation to the social sciences, there is a leadership role, a networking role, which you are taking. We are just putting to you that perhaps there is more need for an overall leadership role to be taken. I would like to move on, if I might, to the OST science review and in that review OST says that “DCMS should assure itself that the NDPBs’ science is being appropriately shared and exploited in the national interest.” How is DCMS setting about doing this?

Mr Roe: We have touched on quite a few aspects of that question in the Committee’s previous questions, but would it be helpful if I said just a bit about perhaps the most prominent recommendation which was in the report, which was about appointing a Chief Scientific Adviser, if it would be helpful for me to focus on that aspect?

Q46 Chairman: Yes.

Mr Roe: It is certainly the case that we did indicate our general welcome for the review in March last year, and in September we provided a point-by-point response to quite a large number of recommendations that were made, welcoming them, always against the background of some of the issues we have talked about today, which are our interest in social science and the degree of autonomy that our bodies quite properly enjoy. As I say, a key recommendation was the recommendation to appoint a Chief Scientific Adviser, which we hope to be in a position to do before too long. We are discussing with colleagues in OST the kind of person and job specification that will be most appropriate for a department in the position of DCMS, which is as a relatively small department, with a particularly strong interest in social issues, plus a strong interest in some aspects of hard science. That is one recommendation of the report. There are a number of other recommendations which I think are about how we can help to strengthen networks, and so on, which I think we have tried to answer as best we can in relation to the questions that you have asked us already.

Q47 Baroness Hilton of Eggardon: In your reply to the OST review, which was last September, you said you were going to advertise soon for your Scientist; it is now six months later and you still have not done so and you are still in discussion. Why is that so?

Mr Roe: We are very keen that we get the right specification for the person. As I say, as a relatively small Whitehall department and one whose primary, but not only, interest in science is in the social science area, it seems to us, and I will let OST speak for themselves, that the kind of person we will be looking for might not be necessarily a person who meets a blueprint which would be helpful to another department. For example, our current thinking is that the person we are looking for would likely be an eminent social scientist, albeit someone who had very strong credibility and strong networks with the wider scientific community, including the hard science community. We are working on this. We are talking to Sir David King and OST colleagues about the precise specification and talking to other people we think might be able to give us some good advice and we hope to make some progress very soon.

Q48 Baroness Hilton of Eggardon: I am not clear why it has taken six months though. I am going to move on to OST in a moment, more generally, but it does seem to me that, if you were promising to advertise last September, by now you should have had sufficient discussions about a job description. I am worried that you are talking about just social science, which fits in with the government policies on this area, whereas we would be much more concerned about it being a hard scientist. I speak as a social scientist myself, my degrees are in psychology, but I still think that hard science is probably more important for them?

Mr Roe: Certainly we would want to take into account the view that there is a role for the person in strengthening our relations with NDPBs including on hard science, but, as I say, our current thinking at the moment is, because of the balance of the department’s interests, probably it would be more appropriate to have a social scientist.

Q49 Baroness Hilton of Eggardon: Thank you. If I could move on to the OST review, to what extent are you monitoring your recommendations and progress-chasing and making sure that, in fact, they are carried out?

Ms Britton: As we have just said, we are in very close touch with DCMS about discussing the appointment of a CSA and I think it is quite a tricky one because we do want someone who can do the job. Of course, from our point of view, you mention the hard science, one of our concerns is that because DCMS has only an intermittent need for hard science to inform its policy deliberations, as opposed to what the NDPBs

are doing, they might welcome that expert support from a Chief Scientific Adviser in going out and getting that. We want the kind of CSA, as well obviously as having expertise in social research and the social science area, who has got that breadth and that respect throughout the science community which means that people will be able to come to him, or her, to act as a lightning-rod, so that those issues can feed in, because they may be ones with which DCMS do not normally work and therefore might not be aware of. So it is to provide that point of entry for DCMS. We are looking for quite a difficult job spec, and I think it is around that the discussion is going on; how can we achieve everything we want to achieve in a department which is small, which has only about 500 people working in it, what is it that really we want this person to do and therefore what attributes should they have? More generally, we are pleased that DCMS have responded positively to so many of our recommendations, some of them they are actually implementing, other ones they say they are going to implement, and in that sense we do look forward to when they have a CSA because I think a CSA will be instrumental in taking those things forward. I think a lot of it is to do with ways of working, to do with networking, strengthening networks, and so on, and I think this is where such a person can play a good role actually in achieving that.

Q50 Chairman: What role do you envisage that the Chief Scientist will have in co-ordinating the science outputs of the department's NDPBs, and what will he, or she, be doing if they are not playing a co-ordinating role?

Ms Britton: I think their main responsibility will be to the department and to the policy delivery of the department. However, I think that also they will be playing a role in talking to the NDPBs on the various networks, and so on, in a sense to have perhaps those discussions, which might or might not otherwise have happened, but we will be much more reassured with a CSA that the discussions are there, where people can actually raise issues and feed them through to see if they work. I do not think they are there to tell the NDPBs how they should be doing their work. It would be perhaps to help them network more effectively with each other, and of course more widely, because the NDPBs have got a very wide range of interests, and they will be looking in different directions for their networks. I think that person is there to act very much as a figurehead for ensuring that kind of networking happens and to help facilitate that, but I think co-ordination is probably too strong a term, unless there is a very particular issue for which that needs to happen. Then that might not be just the NDPBs, it might be a wider range of

organisations, including OGDs, if a particular issue came up of a scientific nature.

Q51 Chairman: Who will be taking the strategic, board-level decisions in relation to heritage? Is the DCMS equipped currently to consider science issues at a strategic board level, and, if not, who is fulfilling this function in the heritage sector?

Mr Roe: I am sorry to ask you to clarify, but can you give me an example of that?

Q52 Chairman: Insofar as you have all your NDPBs and DCMS looks at it from a corporate point of view, the department acts in that sense as a strategic board. With regard to heritage within the DCMS portfolio, who is there to take this board-level view of heritage?

Mr Roe: The DCMS Board currently includes directors and directors-general from the various directorates of the department and it includes the Director for Arts and Culture, who has heritage issues within his portfolio, and also the Director-General who sits in that part of the department. Any collective discussion would be informed by senior staff who have a close interest in the relevant policy areas.

Q53 Lord Redesdale: Going back to the issue of it being a small area, in conservation, and there being a small number of people, you said that you react to people coming forward and saying there is a problem. The age profile, we heard last week, in the industry is quite old and they will all be retiring quite soon and therefore, potentially, you are going to have a crisis within the profession, with nobody coming through with the expertise to take on the position, especially if a lot of people have moved to the private sector. At what point would you be able to pick that up and what are you doing to address it?

Mr Kirkman: One of the things I should have mentioned and I forgot to is that, with respect to skills and skills shortages and skills problems more generally, the Government now has set up a series of Sector Skills Councils and there is one with which the department is involved, which is Creative and Cultural Skills, which covers the creative sector generally, and has got an Industry Advisory Panel on Cultural Heritage, which has got ten representatives, one of whom is the representative of the Institute of Conservation. There is one mechanism which feeds back through the bodies, can they do their jobs and have they got the skills to do them. There is another mechanism which feeds back through the Skills Council, which is assessing systematically the skills shortages across the heritage and wider cultural sectors and looking at where the gaps are and where the problems are and what needs to be done to address them. They are due to report next year on

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where they think the biggest problems are, in terms of skills, across the sector, and I guess we will just wait to see where they put conservation and conservation science in that.

Q54 Lord Redesdale: You have not had any meetings with ICOM specifically on that?

Mr Kirkman: On this subject, no, I have not.

Q55 Lord Sutherland of Houndwood: I want to switch to the question of European funding. The 7th Framework discussions are now well down the road but they are at quite a critical stage. I think we would like to know what input, on this particular topic, the Government is having, i.e., on the topic of the importance of conservation and heritage science? It is something we do share with our European colleagues very, very much and it is a natural one for a European focus, so perhaps I could ask each of the departments represented what input they have had, if any, and whether they are hopeful?

Dr Ibbett: If I could lead on that, the area of conservation science is caught within the Commission's proposal for the 7th Framework Programme, largely under the heading "Environment including Climate Change". Just to say where we are in those negotiations, at the 28th November Competitiveness Council, ministers agreed what is known as a "partial general approach" on the 7th Framework Programme.

Q56 Lord Sutherland of Houndwood: Now there is a nice expression.

Dr Ibbett: It is a peculiar European term of art, but this text ministers agreed includes a specific reference to conservation science within the proposed activities on Environmental Technologies. There, it is envisaged that the research funded should include, under a heading "Protection, Conservation and Enhancement of Cultural Heritage including Human Habitat" the following areas of research, which are: improve damage assessment on cultural heritage, development of innovative conservation strategies and fostering integration of cultural heritage in the urban setting. The Council also recognised that our cultural heritage is actually a horizontal issue and ministers inserted an explicit reference to the issue in the narrative text covering what is called the "Co-operation Chapter", that is the area of collaborative research in the Framework Programme, across all the thematic priorities the Commission has proposed. That says: "Special attention will be paid to ensuring there is effective co-ordination between the thematic areas and to priority scientific areas which cut across themes, such as forestry research, cultural heritage, marine sciences and technologies." There are explicit references in the current text. As you might be aware, the financial perspective negotiations were

concluded, under the UK Presidency, in December last year and quite recently the Commission released its proposals for the overall budget for the Framework Programme, which amounts to €47.8 billion between 2007 and 2013. The 2013 budget would represent an increase of 75 per cent on its current, 2006, level. This is a lower figure than the Commission had sought originally, but it is still a substantial increase. That is only an overall headline figure and the financial breakdown across all the programmes the Commission has proposed, not just the Framework Programme, is being discussed currently in something called a Trilogue between the European Council, the European Commission and the European Parliament under the Austrian Presidency and those discussions need to continue further. The Commission has not yet produced a revised proposal for the 7th Framework Programme to take into account this proposed budget, so I think it would be premature to speculate on how each thematic priority will fare, but I think it is important to note that the budget for the 7th Framework Programme represents a substantial increase on the 6th Framework Programme.

Q57 Lord Sutherland of Houndwood: In fact, the inclusion of cultural heritage as an expression is an advance, from our point of view, on previous examples, and the 6th Framework, for example. I think we do not just want you to speculate on what might be, we want to know what kind of urging you are doing and what the input is to ensure that as reasonable a share of the overall budget percolates down to this area. Is there urging going on, on both sides, have you estimates of what the size of the problem is, if there is a problem, in terms of need?

Dr Ibbett: I think it is worth noting that it is the level of detail that the conservation heading has within a thematic priority, within a sub-heading of a thematic priority, so that level of detail has not yet been discussed. The heading within which it sits in the Commission's proposal, as it was put forward originally, last April, and indeed in its revised proposal, is likely to see a substantial increase, but how much conservation science gets from that larger part is something which is not currently the subject of active discussion in negotiations.

Q58 Lord Sutherland of Houndwood: Have OST and DTI been taking the lead in these discussions, and has DCMS been involved directly, or indirectly, have there been discussions on this between the two departments, for example?

Dr Ibbett: To inform our position for these negotiations, we had a wide-ranging consultation in 2004. We have input from departments, both formally and informally and there is a network of departments which meets fairly regularly, so other

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government departments do indeed have the opportunity to input.

Lord Sutherland of Houndwood: Thank you very much.

Q59 Baroness Finlay of Llandaff: If I can switch a little bit over to IT to ask you what steps the department is taking to ensure that guidance on best practice in the use of IT is available across the sector, and in particular to ensure that the non-departmental public bodies engage with the private sector in making use of the best available technology and ensuring compatibility?

Mr Roe: I would like to try to answer that question. It is worth saying, is it not, that the rapid development of information technology, and digitisation in particular, is a really important issue for our sectors, and I think it is the case now that many museums have more virtual visitors than visitors who actually go through the door, so that is just a very important background and it is something that we do take seriously. The department has raised the profile of technology; for example, we have established an Extranet with our NDPBs, which we can use to help disseminate advice and best practice amongst our sponsored bodies, and we are developing that now. Alongside that, we are trying to establish various communities of interest around ICT and promoting wider use of shared service opportunities, the first of which is a Web Services Framework Agreement. This is for small-scale, web development which can be carried out with one or two pre-tendered companies, so is an aid to procuring IT. Another key part of the department's work in this area is the Culture Online project, which was established in 2002 to commission a diverse range of interactive projects, and it has brought audiences together using technology more effectively to engage new and existing audiences. That is an example of where a project which has been led and created by the department works with a number of different sponsored and other bodies. The Culture Online team have arranged seminars on accessibility, search engines and web statistics, all of which have been very successful. In terms of the relationship with the private sector, many of our NDPBs and our clients already have close relations or connections with the commercial sector, in order to make use of the best available software. For example, I understand that the National Gallery has a link with Hewlett-Packard and the Tate with BT, and there are lots of other examples at a regional and local level to complement that national picture.

Q60 Baroness Finlay of Llandaff: All of that sounds very positive but we have had and I could quote from some written evidence from the Museum Documentation Association, who stated: "Most

sector investment has been project-based with clearly defined outcomes. While this has enabled the creation of large amounts of digitised material, it has left relatively little investment in Research & Development . . . there is a gap between the available content and the sector's understanding of what the public want in the form of products and services." Is that a problem that you recognise and, if you do, are you taking any steps to address it?

Mr Kirkman: Again, it comes down to the way these services are delivered. I think a kind of delegated-down approach is the right one to take in a situation like this because what you are talking about is segmented audiences for particular museum and gallery services. If you are the National Gallery and you are trying to talk about what digital programmes you want to launch and how you want to reach your audiences and what your audiences are going to want to see, you are going to have very different issues from if you are the People's History Museum or the British Library and the kinds of solutions you are going to want to deliver are going to be different. Certainly I would not rule out the idea that there might be some generic and common themes across the piece that it might be interesting for the department to look at. I think it is not the obvious and only answer and that there is a big role for particular institutions understanding particular audiences and how to engage with them.

Q61 Baroness Finlay of Llandaff: I have just a concern, from your response, that this feels as if there is a lot but it is becoming increasingly dissipated and I am not completely convinced about the level of communication and co-ordination between developments?

Mr Kirkman: Certainly there is some going on where we can see value that can be added. An example would be that recently we have considered funding an 'invest to save' bid, which is led by the Victoria and Albert Museum but involves a range of the other national museums and galleries, which is to produce and package and put into one place educational resources on the web from those national museums. It seemed, in that case, that there was a specific target audience, teachers, so "Let's do a thing that pulls together stuff and targets them." What we have not wanted to do is put in one huge, top-down superstructure, if you see what I mean, but certainly we are open to trying to encourage that kind of participation. There are other examples at regional level as well. For instance, there is a project that is going to be launched in London which is looking at various things, it is trying to give a kind of online history of London, using the resources of the Museum of London and various archives, various libraries, and things, in London, but all through one portal and pulling together a series of quite diverse

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collection management systems, which different organisations have bought for perfectly valid reasons, but with an interface on the top that pulls it all together.

Q62 Chairman: What steps is DCMS taking in its discussions with the BBC on the BBC Charter renewal to ensure that the BBC's digitised creative archive is accessible not just in the short term but that it is maintained in accessible form for the foreseeable future? A relevant question, given today, when I believe the White Paper is being published.

Mr Roe: Indeed, and I hope you will understand that, because the White Paper is being published later today, there is not a huge amount that I can say on that subject. I just wonder whether it would be better for us to give you some information at a later stage,

in answer to that question, in view of your time constraints.

Chairman: In writing; yes, we are very interested in having it in writing, because we are very well aware of what a splendid archive the BBC have and in the past, I think, some of it has been destroyed. We are very anxious that it shall be there for future generations, so if you could write to us about it, we should be grateful. Indeed, can I say to you that if there are any issues that we have raised today where you would like to provide any supplementary information, please do feel very free indeed to write to us. On behalf of the Committee, can I thank you very much indeed for coming. I am afraid we have subjected you to quite a long period of detailed questioning but it has been very useful for us, and thank you so much for coming along. As I say, please do write in, if there are any issues which crop up with which you would like to supplement your answers. Thank you very much.

Supplementary memorandum by DCMS

Q.7 *Contacts with devolved administrations:*

I have undertaken to provide some more information about English Heritage's contacts with their counterparts overseen by devolved administrations.

English Heritage works closely with its counterparts in Scotland, Ireland and Wales. These are Historic Scotland, Cadw, and the Department of the Environment, Northern Ireland.

English Heritage liaises with the home countries on technical policy issues such as the accreditation and training of professionals in building conservation. They have also just granted a licence to the Northern Ireland Environment and Heritage Service to republish the English Heritage technical publications on disabled access.

On a more practical note, English Heritage invests around £1 million a year in SETI based research (including collections care). It has annual meetings with Historic Scotland to discuss SETI based research programmes and potential joint activities. The last joint project was "Timber decay in buildings: a conservation approach to treatment" which was published jointly in 2000—and which went on to become an international prize-winning text book. English Heritage also has joint research underway with the Office of Public Works in Dublin on dry rot. The home countries were also involved in a "Preserving our past" event English Heritage organised with the Research Councils last week in Birmingham. This has resulted in £120,000 being committed to create 12 month interdisciplinary cross-council research clusters on the historic environment with universities, with a view to developing a "joined up" grant programme from 2008 onwards.

Following the launch of the English Heritage Research Strategy in October 2006, English Heritage met Historic Scotland, Cadw, the Department of the Environment Northern Ireland as well as the Welsh and Scottish Royal Commissions to develop the idea of a UK-wide research framework in the Historic Environment. All agree that this would be useful. English Heritage are now seeking to revive the British Isles Technical Forum as a way to take this forward. I enclose a copy of the Terms of Reference for your information.

TERMS OF REFERENCE FOR THE BRITISH ISLES TECHNICAL FORUM

1. The British Isles Technical Forum is a meeting of the heritage services of the UK devolved administrations to improve technical conservation practice across the UK.
2. The membership of the Forum will consist of English Heritage, Cadw, Historic Scotland and the Northern Ireland Environment and Heritage Service.

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3. Observers may also be invited to attend from the Republic of Ireland (the Irish Heritage Council and the Office of Public Works), from the Heritage Lottery Fund, the National Trust, the Historic Royal Palaces Trust and from UK professional institutes: RIBA, RICS, ISE/ICE, the IHBC and RTPI and whomsoever else the Forum deems appropriate.
4. The purpose of the Forum is to:
 - (a) provide an arena for the exchange of information, best practice and research; to align technical policy across the UK; and to develop joint activities concerned with the conservation, repair and maintenance of historic buildings;
 - (b) improve the development and application of technical standards across the UK heritage sector;
 - (c) identify and agree on specific conservation problems confronting the UK and to co-operate in the research and development to find solutions;
 - (d) to agree UK technical conservation research requirements and to feed these into a UK Historic Environment Research Strategy.
5. The Conservation Director of English Heritage will chair and provide the secretariat for the Forum for its first term.
6. The Forum will meet twice annually at capital cities' HQs or other sites as jointly agreed.

Q.62 What steps is DCMS taking in its discussions with the BBC on the BBC Charter renewal to ensure that the BBC's digitised creative archive is accessible not just in the short term but that it is maintained in accessible form for the foreseeable future?

BBC AND ARCHIVES

The Government has, as part of Charter Review, reaffirmed the BBC's duty to maintain its archives, as set out in section 85 of the latest version of the draft BBC Agreement:

85. Archives

- (1) The Executive Board must make arrangements for the maintenance of an archive, or archives, of films, sound recordings, other recorded material and printed material which is representative of the sound and television programmes and films broadcast or otherwise distributed by the BBC.
- (2) Those arrangements—
 - (a) must ensure that every such archive is kept safely, to commonly accepted standards, and
 - (b) must give the public reasonable opportunities to visit the archives and view or listen to material kept there, with or without charge (as the Executive Board thinks fit).
- (3) In making those arrangements, the Executive Board must consult such designated bodies as are engaged in maintaining sound, television and film archives as it considers appropriate.
- (4) The BBC must not destroy, sell or otherwise dispose of any material that it has broadcast or otherwise distributed which it decides not to preserve in any archive without first offering that material, free of charge, to such designated bodies as are engaged in maintaining sound, television and film archives as it considers appropriate.
- (5) Where the BBC's offer is accepted by any body or bodies, the BBC must transfer the material to that body or those bodies.
- (6) In this clause, "designated body" means a body that is designated by order of the Secretary of State for Trade and Industry under section 75 of the Copyright, Designs and Patents Act 1988.

CREATIVE ARCHIVE

The Government regards the Creative Archive as a potentially interesting idea, but recognises that it may also have implications for audiovisual archive-holders in the wider market. It therefore welcomes the BBC's decision to subject the Creative Archive pilot to a full assessment of public value, including market impact, before taking a decision about rolling it out more widely. A public value test will be required for all new services under the arrangements we will set out in the BBC's new Charter and Agreement to begin in 2007.

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The Government expects the BBC to take into account the interests of rights holders as well as the wider public in making this assessment. It is keeping in close contact with the BBC about the progress of the pilot and how it will operate the subsequent public value test.

April 2006

TUESDAY 21 MARCH 2006

Present	Broers, L Finlay of Llandaff, B Hilton of Eggardon, B Paul, L	Platt of Writtle, B Redesdale, L Sharp of Guildford, B (Chairman) Sutherland of Houndwood, L
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Memorandum by Research Councils UK

INTRODUCTION

1. Research Councils UK (RCUK) is a strategic partnership that champions the research supported by the eight UK Research Councils. Through RCUK the Research Councils are creating a common framework for research, training and knowledge transfer.

2. This memorandum is submitted by RCUK on behalf of the Research Councils and represents our independent views. It does not include, or necessarily reflect the views of, the Office of Science and Technology (OST). RCUK welcomes the opportunity to respond to this consultation from the House of Lords Science and Technology Committee.

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

3. The Research Councils provide a strategic and financial infrastructure to support science and heritage, which is bound together through RCUK. The establishment of the AHRC in April 2005 has enhanced this infrastructure, enabling the imperatives of science more closely to be aligned with those of heritage. The integration of the arts and humanities within this research landscape has provided new opportunities for scientists to work with historians of art, architecture, culture and society from antiquity to the present. These relationships, in turn, have provided a basis for closer collaboration with curators and conservators in museums and other heritage organisations, which represent a key user community for arts and humanities research. In this context, the drive to advance scientific knowledge and the development and application of new technologies has become more closely aligned with that to conserve, understand and communicate our cultural heritage.

4. The Research Councils promote the co-ordination of conservation science by enabling and encouraging collaborations between university-based researchers and their colleagues in the heritage sector. This includes targeted research initiatives, such as the *Historic Environment* collaboration recently initiated by AHRC, EPSRC, ESRC, NERC and English Heritage, and which CCLRC expects to join. The initiative will commence with a facilitated event in March 2006 (*Preserving Our Past*), which aims to encourage cross-disciplinary and cross-sector collaboration.¹ It also includes CASE and Collaborative programmes run by the Research Councils, which require co-funding and direction of research by universities and partner organisations in other sectors. A wide range of projects are also undertaken through the Research Councils' responsive-mode schemes, which support ideas emerging from the research base. A good example of the potential for innovative ideas to be supported through this route is the *Genetic Fingerprinting of Medieval Manuscripts* project at the University of Cambridge, which is extracting and studying DNA from manuscripts in order to identify their provenance and inform their use.²

5. A small number of research-intensive organisations in the heritage sector have been recognised as Academic Analogues by the Research Councils, which equips them to apply directly for funding. The Natural History Museum is a long-standing Academic Analogue of the CCLRC, NERC, EPSRC, BBSRC, MRC and PPARC, and the AHRC recently recognised a number of museums, galleries, libraries, archives and heritage organisations in its first phase of Academic Analogues.³ The purpose of the Academic Analogue process is to recognise the scale and quality of research undertaken beyond the university sector and to ensure its integration within national research strategies and the national research base.

¹ www.nerc.ac.uk/funding/sbarchaeology/call—preservepast.shtml

² www.corpus.cam.ac.uk/oldmembers/news.php?newid=52

³ British Museum, British Library, National Archives, Tate, Victoria and Albert Museum, National Portrait Gallery, National Maritime Museum, Royal Commission on the Ancient and Historical Monuments of Scotland.

6. In addition to these formal grant giving relationships, the Research Councils have a number of bilateral concordats with institutions and organisations centrally interested in conservation. For example, AHRC has active concordats with the Museums, Libraries and Archives Council (MLA) and the British Library, and will shortly sign a concordat with English Heritage. Such concordats ensure the co-ordination of strategic planning across agencies and provide a mechanism for the co-funding and co-direction of activities, thereby ensuring the integration of research and practice in areas such as conservation science. They also promote co-ordination across government departments. The AHRC/English Heritage concordat co-ordinates the activities of two bodies, one funded by DTI, the other by DCMS.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

7. Funding of conservation research in the UK is contributed to by several of the Research Councils, whose remit is to support both basic and applied research and to support the training of new researchers. All of the Councils have knowledge transfer and science and society strategies to promote understanding and use of the research they support. Research Council funding includes support for large-scale research facilities; CCLRC, for example, provided around £500,000 of in-kind funding in 2005 to UK users conducting experiments into conservation science (£1 million to users across Europe). AHRC and NERC are the Councils providing the most funding for research and training of either direct or indirect relevance to conservation.

8. NERC provides funding in the form of blue-skies small and standard grants and fellowships for research in the area of *Science-based Archaeology (SBA)*, allocating around £0.5 million per year to new projects and fellowships. The research is administered by the Earth Sciences and Terrestrial Sciences sections of the Council. Areas covered by the Earth Sciences section include archaeological prospect techniques; processes affecting the archaeological record; and the analysis and conservation of archaeological materials. Areas covered by the Terrestrial Sciences section include evolution of the human diet, health and disease; human evolutionary history; and modelling change in human ecosystems. Since 2002 NERC has also been funding a programme (EFCHED,⁴ £2 million over four years) with the main aim of integrating and strengthening UK research in human evolution—exploring the interface between the disciplines engaged in human evolution research, from the classic ones (palaeoanthropology, archaeology and palaeoecology) to the emerging ones (evolutionary genetics and palaeoclimatic modelling) and allied disciplines such as neoecology.

9. AHRC supports archaeology research where the emphasis is on the understanding of past human life and culture, and makes grants totalling around £4 million per year. AHRC's interests extend beyond archaeology to museums' practice, librarianship and information science, to which it makes grants totalling around £2 million per year, as well as history, architecture, languages, classics and religion, all of which are crucial to the understanding and transmission of cultural heritage through the buildings and objects in which it is embodied. The AHRC Research Centre for Textile Conservation and Textile Studies at the University of Southampton⁵ provides an example of the AHRC's investment in conservation research, establishing a platform for multi-disciplinary research into the care and interpretation of historic textiles.

10. When drawing funds from the Research Councils, conservation research is in competition with a wide range of other research areas. In responsive-mode, the amount of money made available for conservation research primarily depends upon the excellence of the research to be undertaken, and thereby the research base on which it is founded. The Research Councils make an important contribution to this through their investment in training and in the sustainability of the research base, but there are many other stakeholders such as the Higher Education Funding Councils, universities themselves and the relevant government departments throughout the UK. In NERC, an SBA Strategy Group worked over several years to encourage more applications and promote blue skies funding in the SBA area. The Research Councils also seek to address specific research needs through targeted programmes, but ultimately the overall flow of investment follows the best research. Since their budgets are finite, the Research Councils cannot provide sufficient funding to meet all of the scientific needs of the heritage sector, any more than they can provide all the funding requested by other sectors.

11. Although the bulk of Research Council funding focuses on support for research, they also provide through CCLRC a unique set of underpinning resources for conservation science. CCLRC facilities are primarily concerned with cutting edge materials science, which may be applied to the identification and assessment of materials, as well as their preservation and degradation over time. Through its large-scale facilities, which are free of charge to organisations with Academic Analogue status, CCLRC provides tools to help conservation scientists solve their problems. CCLRC already enjoys strong working relationships with

⁴ EFCHED: *Environmental Factors in the Chronology of Human Evolution and Dispersal*: www.nerc.ac.uk/funding/programmes/progsummaries/efched.shtml

⁵ www.wsa.soton.ac.uk/conservation-and-museums/the-ahrc-research-centre-for-textile-conservation-textile-studies/default.asp

a number of museums, researchers in universities and cultural heritage groups, who utilise the facilities and scientific expertise of its staff to find answers to their questions. CCLRC is seeking to expand these relationships and wishes to encourage further collaboration and cohesion between these groups, using workshops and direct promotion to museums and conservation science groups. With the addition of a new group of heritage organisations as Academic Analogues, there is a need to highlight the possibilities inherent in the use of CCLRC facilities.

12. One of NERC's research centres, the British Geological Survey (BGS), is active in research relevant to cultural heritage, with some of its work supported by the Aggregate Levy Sustainability Fund (ALSF) administered by the Department for Transport. The centre provides a wide range of services. These include the provision of information on building-stone characteristics and location to allow the matching of stones to buildings for repair. It will identify the building stone used in the original construction and provide advice on the problems of putting stones with different characteristics together and how they age *in situ*. It also gives advice to museums on the decay of rock statues and facades (including microbiological decay), and is itself the curator of a statue of Hercules in Portland stone, as well as the holder of several collections of rocks, photographs, artworks and written material relating to the history and heritage associated with geology.

13. The growth in interaction with CCLRC facilities masks a potential problem. Until a few years ago, little conservation research was conducted at CCLRC facilities, with the majority of small-scale research taking place within museums' own science laboratories. These operations appear, however, to be in decline. Although there are several museum consortia-based conservation science departments in existence, for example the Liverpool Museums Consortia Conservation Centre, "in-house" scientific presence appears to be diminishing. This potential problem will increase alongside the complexity of the science required to resolve conservation problems. A case may then arise for central conservation science facilities to ensure that sufficient critical mass is attained.

14. Some of the national museums and galleries have established scientific groups to assist in conservation and conservation research, in addition to supporting the curatorial study of collections. Around 30 UK scientists working in this field are employed directly by museums and galleries, but competing pressures are increasingly constraining museum-based scientists from undertaking long-term research projects. Without such scientific staff, museums and heritage groups would lack knowledge of the techniques available to them and it would become even more difficult for organisations such as the CCLRC to engage with them. This is a potential barrier to advancing the knowledge and preservation of the UK's cultural heritage.

15. Museums face increasing challenges in meeting their fundamental duty to preserve their collections. In addition to the latest scientific developments, the effective conservation of the collections also depends on detailed historical understanding of materials and techniques. The AHRC already funds such research in universities, but in order to identify the training and research needs of the UK's museums, galleries, libraries and archives as a whole it is carrying out a consultation.⁶ Amongst other issues, respondents are asked to prioritise the requirements for research and/or training for conservation and preservation, bearing in mind the subject domain of the AHRC.

16. The profile of conservation studies and research is another important ingredient. There is a strong market for MA studies in conservation, in terms of both the supply of and demand for graduates. This is founded on a broad conception of conservation, which responds to the needs of the heritage sector. Within universities, there are pressures to focus staff expertise more narrowly in areas which may appear, for the purpose of the Research Assessment Exercise (RAE), more fundamental and thereby more intellectually and methodologically challenging. Relative to the disciplinary areas with which it is often co-located, for example archaeology and history of art, conservation research and teaching is also expensive. This has, in some cases, resulted in the closure or re-constitution of successful MA programmes.

17. In the area of fine art conservation, there are only four UK MA programmes, each of which recruits limited numbers and lasts more than one year due to the specialist nature of the training. Collectively, around 10 students are recruited to these programmes in each year. Although AHRC support for MA programmes is normally restricted to one year, it has changed its regulations to provide support for students from the start to the end of their studies on such courses. AHRC is also progressively enhancing its stipends for students on vocational MA programmes, with the aim of securing equality with those following research preparation programmes. AHRC is, however, reviewing whether programmes such as these are best supported through a process of open competition.

⁶ www.ahrc.ac.uk/mgresearch

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

18. The practice of employing scientists in museums is more common within the UK than elsewhere. In continental Europe, for example, the favoured approach appears to be to utilise academia or “central” conservation science labs. A record of conservation research conducted at CCLRC’s Synchrotron Radiation Source provides some data that may be revealing. The SRS is the UK’s brightest source of ultraviolet light and X-rays for non-invasive research in materials and life sciences. Over the last five years around 250 days of beam time have been utilised for conservation science experiments, around 40 per cent of which were allocated to experiments from UK groups. Almost half of these 250 days occurred in 2005 alone. At ISIS, CCLRC’s pulsed neutron source, 187 days of beam time have been allocated to conservation science activities in the last five years. Of these 187 days, 21 days were allocated to users from the UK, with the remainder being allocated to other European users. Although it is difficult to identify a pattern from such a small number, usage appears to be increasing, with eight days already scheduled for UK users during the first half of 2006.

19. Private and charitable investment provides the US with a significant competitive advantage. Bodies such as the Getty Research Institute and the Smithsonian Institution have established themselves as world-leaders in conservation research and training with the aid of significant private investment. Notwithstanding this, there is the potential for UK researchers to lead in niche areas such as post-conflict heritage management, for which technologies such as satellite imaging play an important role. A tailored training package, which was developed by Bournemouth University’s School of Conservation⁷ for Iraqi heritage professionals, typifies the possibilities in this area.

20. Another potential advantage for the UK is that it is one of the few countries which provide significant public research funding to researchers in the arts and humanities. Conservation research at its best should be multidisciplinary in nature. With the location of the AHRC within RCUK, the UK is better able to work across the “science” and “art” boundaries as researchers on both sides have access to significant research funding. While the bridging of this divide requires active and continuous effort, the UK at least has the possibility of bringing researchers from both sides together to focus on a subject of common interest to them. This would be much more difficult in a context where the arts and humanities community had not been oriented towards team based research by a dedicated Research Council.

21. This potential advantage will only be realised if the two sides of the art/science divide reach out to one another, a challenge that the Research Councils are seeking to address. In addition to supporting a series of Arts/Science Fellowships with the Arts Councils of England and Scotland, AHRC is planning to co-sponsor workshops with CCLRC to discuss the possibilities for using cutting edge science in the areas of painting and archaeology. AHRC and NERC are also collaborating on the provision of underpinning infrastructure through the radiocarbon dating facility at Oxford University.⁸ NERC has also fostered collaboration through a directed programme on urban regeneration (URGENT).⁹ One of the projects supported by this programme considered the effect of urban development on archaeological sites. The outcome was a technique and set of guidelines to help preserve artefacts and archaeological deposits *in situ* during urban construction projects. EPSRC has promoted bridging of this divide through its Culture and Creativity programme, which has supported research that has potential for both scientific and cultural outcomes and can only be carried out through collaboration between researchers from the two communities, for example in the areas of engineering art¹⁰ and science and art in ceramics.¹¹ The Research Councils are committed to investing further in interdisciplinary work of this kind, and to ensuring that their structures do not perpetuate boundaries between disciplines and research communities.

Is there a satisfactory process to develop practical applications of conservation research for the market?

22. The prospect exists for a more visible input from UK-based companies in collaboration with UK researchers. If the Research Councils were able to improve their links with conservation science groups to undertake more research in this area, then there could be scope for knowledge transfer of technology and expertise—such as research and development innovation prototyping of portable instruments and monitoring devices—into spin out companies.

⁷ www.bournemouth.ac.uk/conservation/

⁸ www.rlaha.ox.ac.uk/O/orads.php

⁹ www.nerc.ac.uk/funding/thematics/urgent/index.shtml

¹⁰ www.eee.kcl.ac.uk/mecheng/mam/engart/index.htm

¹¹ www.artdes.mmu.ac.uk/rnsacg

23. The Research Councils' Business Plan competition provides one avenue for this, enabling novel research ideas to secure the investment necessary to develop successful businesses. One of the successful projects in the last round of the competition focused on the use of augmented reality technology to add optional 3-D images to museum exhibits.¹² The prize money awarded by the competition funded the design and build of a fully functional and tested prototype unit, which has enabled further seed-corn funding to be secured.

24. The DTI's Knowledge Transfer Partnerships scheme,¹³ which is sponsored by all of the Research Councils and supports collaborations between businesses, universities and graduates, provides another route. AHRC recently joined the DTI scheme and is also establishing its own mechanism for supporting partnerships. This responds to the particular needs of micro-businesses and research users in its community, for example museums and galleries, whose interests may not solely be commercial.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

25. Conservation science is already being used in this way. RCUK's Science and Society programme, which is administered by ESRC, has supported a programme with museums entitled *Communicating Science through Novel Exhibitions and Exhibits*.¹⁴ The project addresses how people respond to exhibitions in science museums and how we can design and deploy exhibits to enhance engagement and participation. It involves video-based field studies in science museums and of the design and development of exhibitions. The aim is to make a significant contribution to current debates in the social sciences concerning participation in museums and the ways in which the public can become more engaged with scientific issues and debates. NERC and BBSRC are currently using Cardiff Museum and other similar venues to host an exhibition on biodiversity, and are keen to build upon these links.

26. CCLRC's *Talking Science* lecture and public engagement programme has included elements on conservation science. Over recent years, public talks have been given on work to preserve the Mary Rose, on analysis of the Qumran (Dead Sea) scrolls, on the science used to explore the hidden secrets of works of art at the Victoria and Albert museum, on the use of Egyptian mummies to provide clues to solving modern diseases, on work to identify the mummy of Nefertiti, on the use of lasers for the cleaning of artwork, on the facial reconstruction of historical figures and the use of dendrochronology to explain the legend of King Arthur. Collaborative research involving CCLRC has commonly provided the basis for the programme and the feedback from audiences has been extremely positive. By demonstrating technological applications in cultural heritage, the science community reaches out to new audiences which may not normally be interested in science.

27. ESRC and EPSRC's PACCIT programme (People at the Centre of Communication and Information Technologies)¹⁵ has supported research examining how people respond to, interact with and collaborate through, new forms of interactive, mixed media exhibits in museums and galleries. This project also considered how such exhibits are designed, created and deployed, and the extent to which they serve to enhance experience, interaction and collaboration. The research will contribute to our understanding of the design, use and experience of new forms of artwork, and more generally the ways in which information and communication technologies may successfully be used in public domains to enrich participation and collaboration.

28. AHRC is supporting a range of projects which have demonstrated the interface between conservation and the public understanding of science. Most notably, AHRC funding for the Mitchell and Kenyon film collection led to a major TV programme, a component of which focused on conservation of the unique film archive. The TV programme, and the subsequent DVD release of both the collection and the TV programme, was massively successful, suggesting that conservation linked with history could provide a potent package for furthering the public understanding of both the past and the science of conserving the past.¹⁶

¹² www.epsrc.ac.uk/Content/Documents/BusinessPlanCompetiton2005/VEMDis.htm

¹³ www.ktonline.org.uk/

¹⁴ www.sci-soc.net/SciSoc/Projects/Communication/Communicating+science+through+novel+exhibits+and+exhibitions.htm

¹⁵ www.paccit.gla.ac.uk/

¹⁶ www.shef.ac.uk/nfa/mitchell—and—kenyon/index.php

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation? Is there scope for improving the use that UK galleries, museums and others make of such technology?

29. Digitisation is an obvious way in which public engagement with objects of cultural importance can be promoted. Such digitisation enables easy access to cultural resources. It also often allows users to scrutinise such objects much more closely than would be possible in a museum, library, gallery or archive. AHRC has invested in digitisation projects of this kind since the establishment of its predecessor organisation in 1998, and will invest £6 million in digitisation projects in 2005–06 alone. During 2006, AHRC will be working with key partners such as the MLA, the Joint Information Services Committee (JISC), the National Archives and the British Library in order to identify the highest priority resources for digitisation, both in terms of their research potential and their interest to a wider public. A project to support digitisation and research into newspaper materials and sound recordings in the British Library and the US Library of Congress has already been initiated.

30. IT aids, such as “touch screen” information points, virtual reality and 3D imaging could be applied to conservation science displays. Use of computer animation and virtual reality help to interest the public and add far more interest to an object which would otherwise appear one dimensional, and untouchable whilst sitting in a display case. As long as members of the public wish to see original artefacts on display, IT can provide added value that will enhance the experience immensely. Both CCLRC and AHRC have experience of this type of public engagement work.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

31. There are many examples of excellent projects relating to the digitisation of material, as noted previously. A particularly good example, however, is the Digital Shikshapatri project, which puts the whole of the Shikshapatri on-line. This fragile document, held at the Bodleian library, was written in Sanskrit by Shree Swaminarayan, founder of Swaminarayan Hinduism. This project not only made available on-line a key text of Swaminarayan Hinduism, it added value to the text by providing multimedia content, a glossary, an essay on the resource and a host of useful suggestions for further reading. Crucially, it used the web as a space in which to effect virtual cultural restitution—the text can now be accessed by Hindus worldwide.¹⁷ This project both protects the text, by making it available online, helps readers interpret the text and eliminates, to a degree, issues of cultural restitution.

32. Three AHRC-funded projects on medieval England exemplify the potential for digitised resources to illuminate the past: the Corpus Vitrearum Medii Aevi, an online collection of medieval stained glass from across England and Wales; the Prosopography of Anglo-Saxon England, a comprehensive database of people who lived in England from 597 to 1042; an Electronic Edition of the Domesday Book, an online text of the Domesday public record of 11th century England, which includes summary statistics and textual commentary.¹⁸

33. The CCLRC is involved in the European Union’s FP6 Ancient Charm European project, which started on 1 January 2006. The project aims to develop novel neutron tomography for non-destructive 3D phase and element imaging of cultural heritage objects. This means that the public will be able to view 3D images of artefacts that would otherwise be unseen; eg imaging internal repair “structures” and element distributions inside objects like brooches, small statues, swords etc where “structures” could be repair parts, or support structures inside the artefact.

34. EPSRC’s Equator interdisciplinary research collaboration has developed the Augorscope 2, a portable mixed-reality interface for outdoors. This has been used to re-create Nottingham’s medieval castle on the site of the modern one, thereby enhancing the visitor experience.¹⁹

13 February 2006

¹⁷ www.shikshapatri.org.uk/

¹⁸ www.cvma.ac.uk; www.pase.ac.uk; www.domesdaybook.net

¹⁹ www.equator.ac.uk/index.php/articles/541

Memorandum by University College London

SUMMARY

1. Conservation science is an emergent discipline. It brings scientific research to the protection of material cultural heritage from deterioration including the interactions between ancient, traditional and modern materials and the environment; their durability, life cycles and maintenance requirements. Its further development, for which there is great potential, risks being impeded by a confusion of responsibility among government departments, NDPBs and other agencies. There is therefore a need for a National Conservation Science Research Strategy to identify priorities for future research and funding for its delivery.
2. There is a need also for a repository of knowledge and a dedicated funding stream for scientific research for the moveable and immovable cultural heritage. One of the research councils—ideally EPSRC—should be charged with drawing together the strands of conservation science research funding. This will enable the existing rich mix of research by universities, museums, galleries, libraries, archives, NDPBs, government agencies, independent charities and commercial and industrial enterprises to flourish.
3. At an international level, a fourfold decline in funding between the 5th and the 6th European Commission Framework Programmes for Research and the simultaneous shift to industrial scale research which is not applicable in size and complexity to cultural heritage, have had a negative effect. It is important to recognise that conservation science research functions best in small interdisciplinary teams. Not only is funding poor and highly fragmented, but recent structural changes at an international level have made the situation worse.
4. The conservation of collections in museums, galleries, libraries, archives and historic properties is particularly vulnerable from the dearth of funding for conservation science research. A recent questionnaire on research funding for historic collections disclosed a total of £10 million over the last decade. The opportunity exists for the moveable heritage to become a central focus for conservation science research and to be accorded levels of research funding that will enable it to grow.
5. There are real opportunities for knowledge transfer from conservation science research to be capitalised. Universities are increasingly experienced in transferring knowledge to practitioners. Education is a key channel for bridging the gap between conservation science research and practice.
6. There is real opportunity for research in the development of Information Technology for cultural heritage. The possibilities of Information Technology can be best realised in the areas of intellectual and sensory access.

INTRODUCTION

7. As the fourth-ranked UK university in the 2005 league table of the top 500 world universities produced by the Shanghai Jiao Tong University, University College London (UCL) has an active multidisciplinary research community that applies science, engineering and technology to increase knowledge and understanding of cultural heritage. Annex 1 summarises the contributions of 11 UCL research areas to the subjects of interest to this inquiry.

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

8. In the UK, universities, national museums, galleries and archives are major instigators of conservation science research for collections. Organisations such as English Heritage, Historic Royal Palaces and the National Trust in England, and Historic Scotland carry out research in the built heritage, commission research or participate in research projects as end-user stakeholders to a greater or lesser extent. Internationally several countries have dedicated research institutions (eg the Doerner Institute in Munich, the National Research Council's Institute for Technologies applied to Cultural Heritage in Rome and the Institute for the Conservation and Promotion of Cultural Heritage in Florence) which are either dedicated in part or wholly to cultural heritage research.
9. Over the past few decades, there have been a number of attempts to scrutinise and facilitate the application of science to cultural heritage. These include reviews and workshops under the auspices of the Science-based Archaeology Committee of the Natural Environment Research Council, and the creation of a conservation research group within the Conservation Unit of the Museums & Galleries Commission. Neither body exists today. A colloquium was held in 1997 entitled *Conservation Research: Needs and Provision*,²⁰ which led to the creation of a Conservation Research Strategy Group. The Group came to nothing largely because of lack of resources combined with the enormity of the task. There is currently no body in the UK that has any strategic

²⁰ The proceedings were published in Foley K and Shacklock V (eds), 1998. *Conservation Research: Needs and Provision*. Leicester: De Montfort University.

overview of needs and provision for conservation science including any mechanism for promoting and co-ordinating collaboration among universities, museums, libraries, archives, historic buildings and other organisations.

10. The following table summarises the level of collaboration in the UK among different categories of researchers which emerged from the declared responses to a recent questionnaire survey carried out by University College London (completed in January 2006):

International	UK					
	Universities	Museums	Galleries	Archives/ Libraries	Government Agencies/ NDPBs	
Universities	26	5	14	9	7	61
Museums	10	11	0	5	0	26
Galleries	0	0	5	0	0	5
Archives/ Libraries	4	3	0	10	0	17
Government—National or Local	1	0	0	0	0	1
Government Agencies/NDPBs	12	0	0	2	0	14
Research Institutes/Academies	20	1	0	4	0	25
Commercial/Industry/SMEs	16	2	2	6	0	26
Independent Charities eg National Trust, Historic Royal Palaces	10	0	0	0	1	11
Others eg Getty Conservation Institute, private estate	1	1	3	0	0	5
Total	100	23	24	36	8	191

11. The growing interest of research councils in the UK, particular EPSRC in end-user involvement in research has led to an increase in direct collaboration between cultural heritage organisations and universities. The opportunity given to museums and galleries by AHRC to apply for the status of academic analogue will require an increase in resources to provide for an expanding pool of researchers. Informal networks are created through encounters among researchers from museums and universities at conferences and through membership of professional bodies. However, lack of co-ordination is another manifestation of the lack of national research strategy.

12. We perceive little direct interest and support from DCMS for scientific, engineering and technological research for cultural heritage. While English Heritage champions scientific research in the historic built environment on behalf of DCMS, there is no equivalent body for historic collections in museums, galleries, libraries, archives, churches and historic buildings as the Museums, Libraries and Archives Council has failed to take on this role. Researchers have to follow other leads to determine strategic priorities for research as DCMS does not routinely use scientific research to inform policy. This fact and the fragmentation of funding sources create much time wasting, with researchers working imaginatively to seek out different funding sources. The fragmentation of responsibility for research among different government departments, NDPBs and agencies means that research priorities do not routinely include cultural heritage research needs and the resulting ignorance can put cultural heritage at risk as the following example illustrates:

In 2001 the Council for British Archaeology reported unnecessary and irreversible damage to historic agricultural buildings and farmsteads by the measures taken to disinfect them from Foot and Mouth Disease. In its technical guidance, English Heritage was able to point to the fact that limewash is a tried and tested, cheap, readily-available, traditional farmyard coating material used for cleansing, disinfection and decoration for hundreds of years. However it had to make it clear that limewash was not a Defra-approved *proprietary* disinfectant, even though it could be used for the treatment of historic and other difficult to clean buildings as a high pH, *non proprietary* material which was confirmed by the Institute of Animal Health.

13. What follows is a snapshot of what we perceive as the distribution of responsibility among government departments, NDPBs and agencies other than DCMS:

<i>Threats</i>	<i>Responsible Department</i>
Natural disasters, such as hurricanes and tidal waves and other natural phenomena such as flooding caused by rising sea levels or flood defence breaches. Virtually all the cultural heritage must be considered totally vulnerable to severe natural disaster and to phenomena associated with climate change.	Environment Agency

<i>Threats</i>	<i>Responsible Department</i>
<p>Fire and emissions from burning materials and fuels such as the recent destruction of the oil distribution terminal in Hemel Hempstead. Heritage sites are affected by dry and wet deposition of pollutants, and subsequently salt rich rain, increasing chemical deterioration of monuments, sites, museums, libraries and archives can also be endangered through exposure to the aggressive conditions.</p>	Environment Agency
<p>The effects of pollution are ubiquitous. While the negative influences of some pollutants, such as SO₂, NO_x and TSP, on the durability of most materials is known, there is no long-term programme to map the damage to heritage materials and plan preventive measures.</p>	Defra
<p>Agricultural and soils policies have major implications for the long-term preservation of cultural heritage such as the chemistry and biology of buried soils, the physical structure of buried archaeological deposits, drainage for land (arable or pasture), management and extraction of specific materials for example, peat extraction in the UK has had a major deleterious effect on the preservation of the archaeologically-rich wetlands.</p>	Defra
<p>Major impact of transport policies where for example, gravel extraction leads to large scale excavation of cultural and archaeological landscapes or massive offshore sand dredging activities. When such activities are forecast to destroy terrestrial and marine archaeological sites, effects can be mitigated in advance. However, indirect effects, such as the long-term impact on cultural heritage of coast erosion, are far less easy to forecast and mitigate.</p>	Department of Transport, ODPM, Defra
<p>Aquifer levels are commonly monitored in different urban centres in order to predict deep effects on modern constructions because rising groundwater levels can have serious implications for the structural integrity of buildings and tunnels. Yet the implications of rising groundwater are just as serious for superficial deposits—and the archaeological and architectural heritage within them. Groundwater changes can be dramatic: in central London for example, pumping from the central aquifer over the last 200 years has lowered the water table by as much as 70 metres, and the level is now rising by around one metre per year as industries such as brewing and laundering that have used plenty of water have decreased.</p>	Environment Agency
<p>Water abstraction, often carried out under licence, is granted according to environmental need but without considering cultural heritage impacts. Water abstraction has a considerable and long-term influence on the ground water table, with effects on archaeological and architectural heritage. An example of the deleterious effects on the archaeological sites and structures of groundwater change was the construction of the London Jubilee Line underground tunnels. Although the short-term effect on modern construction is often taken into account in the execution of works, the long-term effect on the built heritage and on the (hidden) archaeological heritage is rarely considered.</p>	Environment Agency
<p>It is generally accepted that construction impacts on above-ground cultural heritage are easier to model than the very complex physical, chemical and biological variables in any buried archaeological site. Archaeologists, architectural historians, scientists and geotechnical engineers have assembled much anecdotal evidence that demonstrates direct impacts through, for example, different piling systems; methods for building suspended slabs over archaeological remains; deep tunnelling systems with compensation grouting; ground preparation techniques, and so on, but are yet some way off being able to model the behaviour of cultural remains subjected to change through redevelopment.</p>	ODPM, DTI

<i>Threats</i>	<i>Responsible Department</i>
It is estimated that 80 per cent of Europe's buildings are over 50 years old. Because of their age they are generally the least energy efficient buildings. In order, to achieve the UK target of a 60 per cent reduction in CO ₂ emissions by 2050 it will be essential that historic buildings also improve their efficiency. There is a real challenge as to how this will be achieved in practice. Some have wrongly suggested that this must include demolition however there is currently insufficient knowledge about the role that historic buildings need to play and the kind of technologies most appropriate to historic buildings as their environmental performance is radically different to new buildings.	ODPM, DEFRA, DTI

14. At an international level, formal co-ordination of conservation science among museums, universities and other organisations has been a function of the criteria for funding for research and networks set out by the European Commission in its Framework Programmes. However, short-term funding for these initiatives means that research teams and networks are created and then dissolve when funding comes to an end.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

15. The total declared amount from responses to the recent questionnaire survey referred to earlier, on research funding for historic collections was in the region of £10 million for the period 2000–09, with the total amount spent in 2005 in the region of £1.1 million. The declared amount awarded by the research councils was £450,000 which represents 0.015 per cent of the total amount of £3 billion per annum invested by research councils on UK science research.

16. One of the major funding problems, apart from general scarcity, is the difficulty of attracting longer term funding to maintain viable teams. The main source of funding for conservation science research over the last 20 years has been time limited project-related funding through the European Commission Framework Programmes for Research. When the opportunity arises to participate in negotiations on research priorities, there is unequal competition from better organised and better funded lobbies such as the energy, water and construction sectors that are able to muster industrial support, something that is not available to cultural heritage. Research funding priorities of the EC have also been difficult to understand because of the complicated mechanism of EU negotiations. Furthermore the issue of subsidiarity for cultural heritage has meant that it has not been possible for the EC to draw up a Europe-wide Research Strategy on which to base its priorities.

17. The question as to whether conservation science research is directed in the right areas can be addressed by highlighting some notable research gaps which are described below under key stages of the conservation process:

- *Understanding materials* including remedying the disparities in understanding of the behaviour of different materials and how they interact with each other, their outdoor, indoor or buried environment; identifying durable traditional materials that have applications in new sustainable construction and in contemporary conservation treatments; developing new repair and treatment materials with potential conservation applications.
- *Monitoring change* including developing knowledge of the mechanisms of ageing and decay and the synergies and reactions that occur; need for new technological tools such as the development of new sensors, remote monitoring, data transmission systems and other IT tools to monitor change, to assess risk and to validate conservation decisions.
- *Modelling and predicting behaviour* including modelling, recording and documenting different environments and contexts and the behaviour of individual materials, composites, objects and structures. Satellite systems, non-invasive and remote monitoring instrumentation and intelligent systems from land development/regeneration and construction industries need to be re-engineered for use in cultural heritage protection. Among the principal areas in need of predictive modelling are those that affect buried archaeology and ancient structures, namely agricultural soil monitoring, engineering aquifers, groundwater modelling, water flow movement, flood relief and indoor environments.

- *Managing cultural heritage* including an assessment of policy and regulation to assess their horizontal impact on cultural heritage. While developments in Information Technology provide opportunities to exploit potential links with the e-science grid, this has yet to take place together with the development of best practice guidance and where appropriate, standards.
- *Preventing damage* including planning for damage prevention due to social, economic and environmental pressures on urban and rural cultural heritage, including townscape and landscapes. Many disaster protection measures are designed exclusively to protect human life. Research is required to develop integrated risk management plans that, while giving primacy to saving lives, take into account the need to protect vulnerable cultural heritage from further damage including salvage, recovery, recycling and reuse of materials.
- *Balancing modern use with conservation of historic buildings*. Historic buildings will only be preserved in the numbers we currently have in the UK if they can be adapted to modern use. This includes adapting them to climate change and increased occupant requirements. Achieving these while minimising CO₂ emissions are major scientific, engineering and technological challenges.

18. To provide a further comparison between needs and the provision of funding, it is worth noting that the EC 5th Framework Programme for Research (1998–2002) allocated £28 million to cultural heritage research while the EC 6th Framework Programme for Research (2003–2007) has allocated £7 million, a fourfold decrease in funding. It is our considered view that this situation is not sustainable, that the UK barely possesses the research capacity and skill base to maintain its cultural heritage at present let alone for future generations. While in January 2006, the Heritage Lottery Fund (HLF) awarded almost £7 million in training bursaries to the UK's dying traditional craft skills, there is no support available to plug the huge gap between the small number of available researchers and the growing needs of the UK's fragile cultural heritage. So while the craft skills base is set to increase in capacity, underlying knowledge in the science of cultural heritage will decline without the advancement needed in areas of traditional science, engineering and technology as applied to cultural heritage. Evidence of the fragility of this research area is the small pool of researchers, the significant numbers of researchers approaching retirement and the few young scientists being attracted and retained to a research area dominated by employment on research contracts.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

19. UK national museums and galleries, national and university libraries and archives and English Heritage are the main cultural heritage-based institutions to employ conservation scientists to carry out research to improve knowledge and understanding of buildings and collections. However the UK cannot be easily compared with other countries in the application of science to monitor the condition and conservation of cultural heritage for a number of reasons:

- *Difference in approach*. In January 2006, nine collaborating universities around Europe (excluding the UK) launched a PhD programme in Conservation Science funded by the EC Marie Curie Programme. The absence of the UK indicates a difference in attitude to conservation science between the UK and some other European countries. In the UK, a post-graduate research degree in science may focus on a conservation subject, but conservation science training through a PhD research programme is unusual. On the other hand, in some European countries it is felt necessary to focus explicitly on conservation science research at a PhD level in order to qualify as a conservation scientist. UK scientists and their professional representative bodies, the Institute for Conservation Science and the Institute for Conservation did not enter a sustained international debate to make the case for the alternative approach. It is possible that the lack of critical mass of scientists working in conservation science in the UK was a deciding factor.
- *Conservation science and conservation no longer core museum functions*. It is likely to become more difficult to engage with national museums and galleries as future research partners due to a clear shift in focus in recent years to public access and marketing at the expense of conservation and conservation science. Conservation and conservation science are widely perceived as a service activity to support burgeoning exhibition programmes. It is our view that it is short sighted to trade off scholarly research for public access and that core institutional objectives should embrace science and research.
- *Lack of co-ordinated support*. Conservation science research has a much wider and diverse base in the UK. However, one cost of diversity is that there is no single route by which research results can be disseminated to potential end-users. For example, University College London has developed a body of research of enviable international quality and character, often with sustained effectiveness beyond initial funding due to substantial rates of publications, imaginative tools of dissemination

such as computer software and damage atlases and by using established mechanisms for knowledge transfer to industry (such as the DTI's Knowledge Transfer Partnership Scheme). However the efforts of individual institutions in a restricted pool of expertise in raising funds, carrying out research and engaging in meaningful dissemination is unsustainable without the infrastructure to help develop these activities.

20. The need for a strategic focus for the application of science, engineering and technology to cultural heritage and its transfer to the field is keenly felt. Cultural heritage in the UK would benefit greatly from a focal point for the application of cutting edge science and technology. By this we do not mean the establishment of one research institution based on the European or Canadian model which would reduce diversity, divert resources available to other institutions such as universities, museums and galleries and be vulnerable to budget cuts. Instead, we envisage a single research council—ideally EPSRC—with a dedicated research funding stream for scientific, engineering and technological research for cultural heritage. This would help overcome the limited and fragmented resources for conservation science research. It would maintain diversity of research activity in the UK which is one of the richest in the world. As a repository of knowledge and a means of signposting research traffic, it could facilitate links with decision-makers and opinion-formers, act as a bridge between science and heritage owners, connect basic and applied research and provide a means for the dissemination of research results so that the transition from research, to application, to awareness-raising through information and education could be an integral part of the research process.

21. A dedicated research funding stream through a single research council should ensure that advanced research techniques are applied equitably to the moveable and immovable cultural heritage thus removing the inequality of access to scientific research in different parts of the cultural heritage field. It would help overcome lack of visibility and the burden of having several government departments, NDPBs and agencies dealing with different aspects of research for cultural heritage. For example, DTI's New Construction Research and Innovation Strategy Panel (nCRISP) produced a Foresight report on "Construction Research and Innovation in the Heritage Sector" in 2005 which considered the immovable built heritage but not the moveable heritage in museums, galleries, libraries, archives and historic properties.

22. A dedicated research funding stream through a single research council could also support the development of knowledge of the complex and interactive nature of chemical and physical processes and their impact on historic material structures which requires the application of advanced chemical and physical techniques. These would help to clarify the pattern of breakdown mechanisms and they could serve as references for effective conservation methods and materials, and as controls for conservation treatments and storage conditions. Moreover, advanced analytical methods and techniques are an essential prerequisite for the development of simple diagnostic techniques necessary for practical applied conservation.

23. Most advanced techniques have not been designed for analysis of cultural heritage which requires high accuracy, micro- or non-destructive analytical procedures applied to small and very irregular sample populations. There is therefore a clear need to develop and modify existing techniques as well as to develop new advanced chemical and physical techniques to tackle many unsolved conservation problems. The conservation field is characterised by small private firms. They generally employ tried and tested techniques and need support to enable them to use new diagnostic tools. However, many instruments are made for highly expert researchers so they need to be re-engineered in order to simplify their use without affecting their quality or accuracy which is possible for many optoelectronic instruments. In addition, re-conservation of cultural heritage due to inappropriate or failed treatments due to the complexity of decay mechanisms can be overcome by complex and complementary comparative studies based on advanced techniques which characterise material behaviour and structures at the macro-, micro- and molecular level.

24. It is useful to compare what has been achieved in three European countries where there has been significantly more stability provided by secure levels of funding, research continuity, knowledge transfer to younger researchers and the building of capacity. The Foundation for Research and Technology Institute of Electronic Structure and Laser in Crete has developed and transferred to market lasers for cleaning a range of cultural heritage materials which has been one of the most significant successes in conservation in recent years. It is considered appropriate treatment from many points of view: precision and selectivity of the removal action, respect of historical layers (for example, patinas, gilding and paint remnants), avoidance of the use of diffusive chemicals into the substrate and repeatability if needed. The overall result is much better than that achieved with other techniques. New methodologies are being developed at the Science Research Council in Seville, Spain to improve calcium carbonate precipitation on calcareous stones as a means of consolidation, based on biomediated calcite precipitation. The formation of minerals by organisms is a common phenomenon and many kinds of biomineralisation products and processes are present in most classes of organisms. The growth of new calcite crystals inside porous stone consists of a biomineralisation process induced by organic matrix macromolecules (OMM), extracted from marine shells and skeletons. The

Government of Italy invested £27 million in a special four-year programme (1998–2002) for scientific research for cultural heritage which involved 350 research groups working in universities, research institutions and enterprises and whose areas of research included ancient resources; analysis, diagnosis and restoration of paper, artistic and architectural heritage, biological archives and museums.

Is there a satisfactory process to develop practical applications of conservation research for the market?

25. The current process for developing practical applications from conservation research for the market is unsatisfactory because it is not well advertised and unequally available to all areas of research in this field. For example, DTI funding is available to promote innovation and boost competitiveness as part of a scheme to help turn scientific progress in the public sector to commercial success. Thus in January 2006 the Tate Gallery received an award of £420,000 under this scheme to develop airtight picture frames to protect works of art on display. Technology transfer from university research to use by heritage owners is unpredictable and entirely dependent on the interest of researchers who may lack motivation and incentives due to the nature of project funding which tends to be pre-competitive.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

26. Conservation science could capture the imagination of the public just as conservation and restoration has done in recent years. It could provide a fascinating springboard to the understanding of science and technology and to demonstrate their practical relevance. There are several success stories of public engagement with conservation, such as the “Stop the Rot” exhibitions in the City Museum, Portsmouth and the Castle Museum York in the early 1990s, the establishment of The Conservation Centre at National Museums Liverpool and the televising of the unsealing of a newly excavated Roman sarcophagus at the Museum of London. The engagement of conservation science with the public has tended to be focused on the British Association for the Advancement of Science Festivals of Science which have included lectures, interactive displays, debates, walkabouts in city centres and media events organised by Research Councils such as EPSRC and the European Commission to showcase what research has been funded.

27. Developments in the field of scientific research for cultural heritage can have wider benefits to society and therefore have the potential of generating interest in conservation science among the public. The following example is of research at UCL on salt damage on monuments which helped research into asthma in children. It also demonstrates how the personal (children’s asthma) can be used to generate public interest in scientific research for cultural heritage.

An unforeseen application of research carried out by Professor Clifford Price at the Institute of Archaeology on salt damage to monuments and museum objects which focused on the study of the behaviour of salt solutions was used by Professor Tadj Oreszczyn at The Bartlett Faculty of the Built Environment in studies of house-dust mite physiology. The house-dust mite is an important causal agent of asthma, a condition which affects more than one in seven children in the United Kingdom alone and is estimated to cost more than £800,000 per year in direct costs. The mite does not drink in the normal way, but absorbs moisture from the air by means of a salt solution secreted from the supracoxal gland. Research has been carried out to determine whether mite populations can be reduced by control of the indoor environment, in a manner directly comparable to the reduction of salt damage in the cultural heritage by environmental control.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

28. Museums and other cultural heritage institutions already use IT in a variety of areas to contribute to public engagement. These vary from documentation and the provision of information (via online catalogues or educational materials), interpretation of displays and sites (via multimedia presentations, webcasts, virtual exhibitions, virtual environments, animatronics) to marketing tools. Beyond these tools innovative cross-disciplinary research includes themes as diverse as those in which UCL is currently involved such as distributed 3D scans as tools for curators and collectors to compare groups of similar objects; 3D scans as a means of monitoring decay; adaptation of radio frequency identification (RFID) tags for application to fragile and unique objects in a range of media and interactive badges as a means of visitor tracking and interaction.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

29. In the context of the historic environment, the technique of space syntax has used computer analysis to gain insight into the spatial patterning and functioning of urban and building interior space. Space Syntax which was originally aimed at the urban scale where it has been instrumental in important planning decisions such as the redesign of Trafalgar Square in London, has also been applied to improve visitor flows in museums and galleries such as the Tate Gallery. Its use has focused on targeting minimum change to the historic fabric of buildings that can be shown to be necessary if the social and economic life of an area is to be conserved. There is scope for improving the use of space syntax by planning authorities and English Heritage.

30. Pervasive technologies are currently being developed by a multidisciplinary research team including three universities (University of Bath, UCL, Imperial College), four large companies (Vodafone, Nokia, Hewlett Packard Labs, IBM), one SME (Node), one local authority (Bath and North Somerset Council) and one museum (Holborne Museum, Bath). The team is working on a new access mechanism for the public in many museum and non-museum settings using continuous communication linked to GPS location and mobile devices.

31. In museums, too much attention has perhaps been focused on the potential of technology rather than on audience needs. For example, many museums have made great progress in producing online catalogues but comparatively little effort has gone into the development of effective tools for cross-collection searching. There is scope here for MDA, the UK's lead organisation on documentation and information management, to strengthen its role in the transfer of new technologies to museums.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

32. The following are two outstanding examples of the use of IT in the UK to improve access to and understanding of cultural objects:

- *WW2 People's War* was a major outreach project by the BBC to capture the extraordinary stories of ordinary people onto the Peoples' War website. Phase One of the project sought to support people to contribute their memories by establishing a network of Associate Centres, where people without access to IT equipment could get help using the internet. These centres were encouraged to run reminiscence events and activities as a "hook" to attract members of the public. Over 2,500 partner centres signed up, including many public libraries and museums. Phase Two of the project involved a dedicated team of broadcast journalists working in Nations and Regions to showcase some of the content already contributed to the website, and to encourage many more people to take part. Over 2000 volunteers were recruited and trained to act as story gatherers. Many of these volunteers worked with the Community Service Volunteers action desks based at every local radio station in England. Schools were also been encouraged to take part—many of them building stronger links within their community as a result. The 60th anniversaries to commemorate the end of WW2 were a key focal point for this work. WW2 People's War took part in the Nations Commemorations of the end of WW2—on VE Day, VJ Day and during Veterans Awareness Week which ended with the National Commemoration Day. Activities took place across the country—including an exhibition in St James's Park in London.
- *Digital Egypt for Universities*, a 3,000 page website produced by UCL and based on the Petrie Museum of Egyptian Archaeology gives contextual information on the collection, seminar notes and bibliographies, and 3D visualisations of relevant archaeological sites. It supports study at Higher Education level across a range of disciplines.²¹

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²¹ <http://www.digitalegypt.ucl.ac.uk/>

Annex 1

33. The credentials of University College London in the research areas of interest to the Inquiry are listed in the table below. Further information can be found at www.ucl.ac.uk

<i>UCL involvement in cultural heritage</i>	<i>Built Heritage</i>	<i>Collections</i>	<i>Areas of interest to inquiry</i>						
			<i>Science for Cultural Heritage</i>	<i>Engineering for Cultural Heritage</i>	<i>Technology for Cultural Heritage</i>	<i>Public Engagement</i>	<i>Application of Science</i>	<i>Conservation Science</i>	<i>Archaeological Science</i>
Museum and Collections		✓	✓		✓		✓	✓	
Centre for Sustainable Heritage	✓	✓	✓	✓	✓	✓	✓	✓	✓
Environmental Economics							✓		
Institute of Archaeology	✓	✓	✓		✓	✓	✓	✓	✓
Earth Sciences	✓	✓	✓				✓	✓	✓
Geomatic Engineering	✓	✓		✓	✓	✓			
Computer Science		✓			✓				
Centre for Advanced Spatial Analysis	✓				✓	✓			
Chemistry		✓	✓					✓	✓
School of Library, Archive and Information Studies		✓							
Built Environment	✓			✓	✓				

Examination of Witnesses

Witnesses: PROFESSOR TONY MCENERY, Director of Research, Arts and Humanities Research Council, PROFESSOR RANDAL RICHARDS, Director of Research, Engineering and Physical Sciences Research Council, and PROFESSOR MALCOLM GRANT, Provost of University College London, examined.

Q63 Chairman: Good morning and may I welcome you to this Select Committee and say how glad we are that you are able to come. May I also welcome the members of the general public who are here. Our declarations of interest are on the information note that is available. Can I put this to you as an opening question. The written evidence from University College London, from Professor Grant's institution, states that "there is currently no body in the UK that has any strategic overview of the needs and provision for conservation of science". Why is this? Do you think that there is a need for a national strategy for conservation science? To some extent, I think this underlies really one of the central issues that we are looking at here: do we need to have more co-ordination within the area? Would you like to start with this issue?

Professor McEnery: I would be happy to comment on that. I think that part of the equation here is the fact that the Arts and Humanities Research Council has only been in existence for 11 months. It is an important piece of the jigsaw puzzle in terms of putting together a strategy on co-ordination for research and conservation of science and heritage more generally, but we have only been around for a short time. In that time, I think we are starting to allow groups to talk to one another and we are the setting up of facilities for co-ordination, but there is much more that can be done and we will do much more. Personally, I am quite open to the idea that we might want to take a more strategic and co-ordinated approach across the research councils to looking at heritage generally and conservation science in particular, but my own view is that the best model for that would be for the Research Council to champion those causes within the research councils and co-ordinate across the research councils.

Professor Richards: Tony McEnery is right. I would add that there is a diversity of other public bodies associated, if you like, with culture and heritage and the Research Councils UK is making a start. There is a meeting at the end of this month that involves all the research councils and English Heritage called *Preserving our Past*, which will be aimed at trying to define priorities and where we go from there and maybe set up some networks to define those priorities.

Professor Grant: Conservation science is a very important but really quite small and fragmented area of research activity. The range of it right across moveable and immoveable heritage creates a very serious challenge for those who argue for greater investment in the area, which we certainly do. The current problem I think arises from the fact that the

immoveable and moveable parts of the heritage have different NDPBs and different research councils with responsibility for the underling science. There is a great deal of fragmentation between them. There is a great deal of work undertaken of course in universities which may or may not be part of work that is being commissioned by NDPBs or by research councils. The English Heritage remit is not UK-wide, so there is a shortfall in establishing a strategy that would stretch right across the United Kingdom. That is where we come in with the written evidence that we have given you. A national research strategy would truly start to build a platform for the future.

Professor McEnery: One last thing I might add, if I may, is that we also need to consider the international dimension to this. There are many funders internationally who actually become directly involved in conservation research in the UK, such as the Andrew W Mellon Foundation. We need also to consider mechanisms for bringing them within this broader picture of heritage and conservation in the UK if we are to get the very best researchers working on this problem.

Q64 Lord Redesdale: You did not mention DCMS in talking about champions in the field. We took evidence from DCMS last week. We gained the impression that they delegate that on to their bodies. Do you think DCMS has a role in championing in this field or do you see it as the role of English Heritage, or indeed do you feel that leadership in this area is going to be devolved to yourselves?

Professor McEnery: Certainly we view English Heritage as a key player in this field and we view them as the main point of contact that we have with DCMS, though we do have others; for example, the British Library is also another very important point of connection here. With respect to English Heritage, we work very closely with them and in our short lifetime we have established a very good working relationship with English Heritage. We fund the collaborative CASE awards, for example, with them, mainly focused on conservation. Also, we are about to sign a concordat with them and we have plans to launch dual funding opportunities, which will bring research in the arts, humanities and sciences together. For us, English Heritage is a crucial player; in fact, the workshop Randal Richards referred to at the end of the month grew out of discussions between the AHRC and English Heritage, so we view English Heritage as a key point of connection there, except of course for written material. That is part of the moveable area of conservation where the British Library is a key contact for us and we are working

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very closely with them. We have a concordat with them and at the moment we are co-ordinating activities between the British Library, the Library of Congress in the US, and arts and humanities researchers very much focused on digital preservation strategies.

Q65 Lord Paul: The AHRC appears now to be taking the lead in the field of conservation science. Can you explain how historically the remit for cultural heritage was negotiated between the research councils, and in particular between EPSRC and AHRC?

Professor McEnery: I will begin in responding to that and then pass to Randal Richards. I would say that the AHRC is championing heritage within the research councils rather than leading on it. It would be very difficult for any one research council to lead and direct when in fact we need so many inputs to this particular area in this particular field, but in some ways one might think of the championship coming from the AHRC as entirely natural. When you look at the constituency that the AHRC covers, it covers many researchers in the first instance. About a quarter of the UK academic population is actually covered by the AHRC and many subjects which are directly relevant to heritage and consequently to conservation are covered by the AHRC: architecture, history, art, museum studies, librarianship. We have a natural constituency of people who find this of direct relevance to their day-to-day work. Also, where we sense, within the museums and galleries sector and the heritage sector more broadly, that there is a thirst for that type of knowledge but nonetheless we realise, if you like, that while the arts and humanities might provide the why and the what to the heritage questions, we need scientists to provide some of the how questions—those questions oriented towards the preservation of materials, for example, or simply surveying old buildings—then that is where we need to interface with the science councils. We do interface with the science councils. Only next month I have a meeting with my opposite number at NERC to discuss our joint stewardship of the area of archaeology. Randal and I meet monthly within the RDG of the Research Councils UK organisation and we also talk frequently off-line. In fact we have talked about the role of arts and humanities in science before in private conversations. So there is a great deal of informal and formal liaison in establishing these boundaries. I hope that is a fairly full answer to your questions.

Professor Richards: The research has been mainly coming through the responsive mode and so the engineering and physical science area is picked up by EPSRC, whereas human geography and planning have been picked up by ESRC, and archaeology in

the past by AHRC and NERC. Most of the EPSRC funding has been on preserving built heritage, and that is usually funded from the engineering and materials programmes. There is also an awful lot of informal contact at the operational level between programme managers. If there are research posts, proposals that come to AHRC, would probably come to EPSRC and say, “There seems to be some science content in this. Are you going to be interested in that? Are you prepared to contribute to it?” Usually we say yes, in terms of it being of sufficient interest. We are about trying to reduce the barriers between cross-council funding, not build them, and to bring a multidisciplinary approach to all these problems which need that sort of approach.

Q66 Chairman: Do you think, though, that the very fragmentation of funding in this area has actually led perhaps to some confusion on remit?

Professor McEnery: I do not think confusion, no.

Professor Richards: No, I do not think so.

Professor McEnery: I think certainly when we have talked to archaeologists they felt that some unfortunate side-effects have arisen from this fragmentation, which we are very actively seeking to counteract. For example, a common complaint I have heard from archaeologists is that they know where to go to get research funding for very cutting edge new science, which happens to be related to old materials; they know where to go to get principally arts and humanities-led funding; but the applied science area seems to be much greyer for them. AHRC is opening up its remit slightly to say that as long as the research questions are oriented towards for example the historical narrative which informs archaeology, then if you do science on the ground, all well and good, and I might talk to Randal and try to get appropriate referees from EPSRC and eventually we may co-fund it, but we are trying actively to counteract what we view as some of the more negative features of this distribution of responsibilities across the research councils.

Q67 Chairman: Professor Grant is at the receiving end.

Professor Grant: At the receiving end, perhaps the picture is not quite as clear as that. It is interesting how it has been described by my two colleagues in terms of informal relations between research councils, but I have to say that on the ground it often seems less of a network and more of a cobweb. We have, I think, a need to look to the future and to see where real leadership can come from and to overcome this fragmentation. Yes, it is perfectly true to say that scientists who are specialists in particular areas will know pretty well where to go for trusted sources of funding for the conduct of research, but I

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think we are wasting a lot of time with people having to cast around into obscure pockets to piece together a funding package to do this work for the future. We would press very hard for clear leadership, a clear conservation strategy which engages of course the research councils and the others from whom you have taken written evidence, but the time has come if we are as a nation to take conservation science seriously to work out what it is and what we need to be doing about it.

Professor McEnery: I should point out that there are potentially new funding regulations coming forward from the research councils which would actually, if you like, clear away some of the cobwebs. In the past, you are right, people had to fish around, put together packages from different research councils and sometimes apply to more than one research council and they would enter this domain of double jeopardy. Under the new regulations which we think we are about to approve, it would often be the case that somebody for example who wanted to do some cutting edge science within a largely arts and humanities-led piece of archaeological research would simply apply to AHRC and we would do the negotiation at NERC regarding what proportion of that grant they would then fund. We are thinking quite actively, as I have said, of mechanisms to try to counteract some of these problems, which have existed and of which we are well aware.

Q68 Lord Redesdale: You said you would like to see a national policy, Professor Grant. Who would implement that because if you turn round to English Heritage, they would say, “We would expect DCMS to do that”. DCMS would say, “It is English Heritage’s problem”. It does not seem as though there is anybody who would want to catch the ball on this one.

Professor Grant: I think that underlines the point I was making before. So far as we in the university sector are concerned, we would conventionally look primarily to the research councils to fund research in this area. There is a very good reason for that, most notably the move in recent years towards funding the full economic cost of research, which for us is tremendously important in a historically under-funded university science environment in the UK. It also seems to me that the research councils, for the very reasons that my colleagues have discussed with you this morning, have the ability to draw together the strands and actually have significant funding through the research councils to apply to this area. They also have, unlike English Heritage, an ability to look at science right across the board and an ability to identify where the basic science, the fundamental science, can start to coincide with the applied science that we need to advance in this area. We would

propose a research council lead on this. In terms of excellence of science, it would be EPSRC we would favour as the lead.

Q69 Chairman: Would you favour ring-fenced dedicated funding, perhaps a dedicated programme devoted to this area?

Professor McEnery: My own view, and of course Randal may disagree, is that ring-fencing would not be the way to go because if we get this right, in essence we would actually be looking at a great deal of our research portfolio becoming multidisciplinary and ring-fencing may simply serve as a cap. We are working on trying to get researchers in different disciplines in the arts, humanities and science deciding to work together. Ideally, I would like to be able to say that in principle the whole of our archaeology budget might be spent in that way rather than say that, even if it goes extremely well, we will only spend £2 million a year in that way.

Professor Richards: I agree: ring-fencing is not the way to try to ensure the research in this area in my opinion because it is so multidisciplinary and because of the experience that EPSRC has had in the past. One way to get research in this area going is if somebody has identified national priorities and you can then put together a consortium of scientists, arts and humanities experts and archaeologists to attack that particular problem. This is something we found very effective in the past in areas such as flood risk management.

Chairman: I am interested also in what you say about the fact that you have been proactive in putting the consortia together rather than leaving it to the individual research group to do the work and then come to you.

Q70 Lord Sutherland of Houndwood: I want to pursue this interaction between the Research Councils just a bit further. It seems to me that the AHRC has a rather difficult job. You have specified that you are championing rather perhaps than commissioning in some cases. In view of your metaphors, I am not sure who is the fly and who is the spider in all of this. There could be a mutual feeding frenzy if there were any real money. The question I want to ask initially is: just how does the AHRC champion the need for some of the very high tech specialties of science that ought to be used in the areas of cultural heritage—nanotechnology, satellite work and so on, and there is a whole string of them? What is the AHRC role there?

Professor McEnery: I would say we do three things. Firstly, of course, we do fund some of that ourselves. For example, we subscribe to the Archaeological Dating Service at Oxford. We are not afraid to fund

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science if we can see that the science is informing arts and humanities-led research questions.

Q71 Lord Sutherland of Houndwood: Can I just interject there? I understand what you are saying but do you have the experts to make the judgments about which areas of science you would fund or has that to be passed over?

Professor McEnery: Our own peer review panel has on it some archaeologists with relevant subject expertise; in fact our Council has on it archaeologists with suitable subject expertise. Also, where we feel we do not have that expertise, we get on the phone to another council and use members of their peer review college just as, for example, if Randal got a proposal which had a strong arts and humanities content, he might get on the phone to me and get a suitable peer reviewer. That would be one way in which we do it. Another way is by actively ensuring that we work to bring together researchers in the arts and humanities with scientists. It is all very well and good for scientists perhaps in isolation to develop techniques. If those techniques do not then get applied, that is something of a tragedy. If those techniques are developed in what one might crudely describe as an intellectual vacuum—ie not informed by the needs of the researchers who are actually putting together the historical narrative, for example—then again that is unfortunate. Through brokering agreements, say, with English Heritage, the British Library and other research councils and bringing people together, we are actively seeking to try to overcome that. It is also the case, and again Randal and I have discussed this, that we would like to see in the long run arts and humanities-led technology development, and so turning round to the user and saying, “What type of technologies might you need in order to pursue your research question?” and seeing whether that then informs a technology strategy. We have talked to the DTI Technology Strategy Board recently about that particular strategy and they think it is quite appealing.

Q72 Lord Sutherland of Houndwood: You might have to change your name as a research council if this goes on?

Professor McEnery: We engage in science.

Q73 Lord Sutherland of Houndwood: I used to do this kind of thing many years ago in the embryonic form where we simply were responsible for distributing PhD studentships and it was bad enough then, but the divergence usually came between ESRC and the postgraduate studentships in the humanities. With the links, and I have noted UCL suggested EPSRC could be a natural leader in this, perhaps I

could ask what the reasons were and for comments from both of you?

Professor Grant: May I certainly do that and perhaps, just before I do so, raise a rider to the question that Lord Sutherland asked and the answer that has just been given. It is that I do not think universities are without responsibility themselves in stimulating the interdisciplinarity that conservation science requires. It should not be necessary, let us say, for an application for an arts and humanities group or a science group in a university to go to a research council who then mediate the interdisciplinarity of it. One of the advantages I could see of a national conservation policy would be as a stimulus to universities. It is the sort of thing that all vice-chancellors are tempted, within universities anyway, to do, to engage the interdisciplinarity engine. I would hope that what might emerge in a national conservation strategy would assist us in that ambition. Lord Sutherland then also asked about why the choice of EPSRC. From our perspective, it is to put sound science at the basis of conservation science, to put world class, leading science there and to encourage EPSRC to think of it in terms of its application in the area of conservation. I think that is the critical challenge.

Professor McEnery: From my own perspective, I note, say, in the evidence to this committee that other submissions have come to different conclusions. I think by and large the conclusion is that it could be either AHRC or EPSRC and, dealing with the case of the Institute of Conservation, I think they said it should be the AHRC. There is clearly a plurality of views on this question. I would be happy to champion heritage in general and conservation in particular within the research councils from the AHRC. I think in some ways we are very well placed to do it. Considering we have only been in existence, as I said, for 11 months, we have actually taken great strides forward in bringing together these threads, to use this image from before. We have an excellent working relationship with many key stakeholders in the heritage sector who would actually be, if you like, key stakeholders for any conservation strategy that was developed if that conservation strategy would develop from the heritage strategy itself. When, for example, English Heritage was looking for a natural partner within the research councils, they turned to the AHRC. Similarly with many of the museums and galleries in the country. I would make a case for the AHRC on the grounds of (a) embedding conservation science within the broader question of heritage; and (b) also looking at the engagement of the different research councils with the heritage sector and seeing where the easiest fit was. I do not know if Randal agrees.

Professor Richards: Yes, I do. I think, saving Professor Grant’s comments, what the EPSRC seek to bring to bear is knowledge of the scientists and technologies

that are available. What we do not know are the problems that need to be addressed, and that is where we rely on the people engaged in that activity. Most of the work that has been done so far that the EPSRC has funded has come from peer-to-peer contacts. Probably one of the best stories is between Sir Mike Brady at Oxford who had a friend at Oxford who was a Roman historian. They had some tablets found on Hadrian's Wall which were of wood covered with wax with some sort of writing inscribed on them. Mike Brady is an image analyst, an image specialist. He was able to illuminate in the proper way and uplift so that they could be translated. The EPSRC also supports what is known as the Surrey Ion Beam Centre, which is mainly used for semi-conductor science. However, it is also used to analyse ancient artefacts—paintings and the patina on statues—so that they can decide how to preserve them subsequently. That is, if you like, being used on the fringes, the margins, in addition to those proposals that we fund directly that come to us, which are associated mainly with the built heritage and how you preserve stonework from the invasions of marine damage and minerals.

Professor McEnery: I must say that I think Randal's example of the Vindalanda tablet is one of the most beautiful examples of arts and humanity-led scientific development that I know of, and it led to the recovery of one of the largest collections of Roman letters in centuries.

Q74 Lord Broers: I would like to make a statement and then ask a simple question of the two research council representatives. It has been my observation that research councils work best when on your staff you have experts in specific fields. Have you appointed experts that could be considered expert in science and heritage?

Professor McEnery: I will respond for AHRC first. We have a number of strategic initiatives which actually do align themselves well with the questions of science and heritage and, through those strategic initiatives, we actually have appointed staff who have relevant expertise. For example, in our landscapes programme, which was of the historical landscape from the Neolithic onwards, we have a panel which is drawn from across the public sector and also the private sector, bringing in expertise, and we have a director who was appointed from the University of Nottingham, who brings relevant expertise with him. Similarly in our Textile Conservation Centre, that is an AHRC centre based at a university in an academic department where they can draw on a broad range of relevant expertise and then we in turn can draw on their expertise. We are very mindful that we do need to bring this expertise in-house.

Professor Richards: We have not appointed any experts as such in the area of conservation science. What we do have are what are known as strategic advisory teams. Every research programme that EPSRC supports and runs has a team of about 12 people from the academic base, from industry and from other government bodies where necessary. They advise a programme manager on what is coming over the horizon, what is needed, where there are gaps, and provide some suggestions about what is needed to fill those gaps.

Q75 Baroness Platt of Writtle: Is research funding in responsive mode sufficient to ensure the future of conservation science? What is the scope for establishing strategic long-term funding? What are the processes you use to define strategy? What data do you use? How do you maintain foresight or do you see yourselves as being purely reactive?

Professor McEnery: That is a wonderfully complex set of questions. The most important thing to say about responsive mode is that, with reference to conservation science, there is some evidence to suggest that, over time, conservation science has received less funding for example from the AHRC in responsive mode than it did in the past. This could be viewed as a very bad thing or a very natural thing. If I look at the area of postgraduate funding, in the recent past conservation MAs that we fund were having a success rate at something like 40 per cent, which is very high. It has recently come down to about 24 per cent, which is very close to the average. You could play a narrative which said, "Oh, it looks as though quality is declining in this area and consequently it is under threat", but actually I think the narrative is quite different. I think the narrative is: these people were used to writing blank applications in their past engagement with NERC; when they entered the arts and humanities funding arena, they had that advantage, but the other arts and humanities researchers are now learning how to write these proposals. So in fact this peak that we saw was a peak, if you like, of opportunity where they were deploying their expertise in grant writing and, as that was democratised across the arts and humanities, it came down to the average. That is the narrative I would tell on that. In terms of whether there is enough money in responsive mode actually to support these areas, I would say: yes, as long as it is leading, cutting edge, interesting and intellectually exciting. That is exactly what research councils should be funding, and we are doing our level best to ensure that we enable that community to develop the most interesting research, often of course in a cost-disciplinary fashion.

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Professor Richards: Responsive mode is where the research can apply at any time for any subject with any opportunity. It can be extremely successful, as was a grant recently funded from EPSRC which has direct relevance to the preservation of buildings, and that was for over half a million pounds to a consortium of universities. Big projects do not necessarily fail. If it is excellent science and it is shown to be of a leading nature and it is shown that they have planned the project well, it has every chance of success.

Professor McEnery: To return to your questions about strategic funding, when we determine strategic funding opportunities, and some of those that we have determined have actually been in the area of conservation science broadly or have at least impacted upon it, as I have mentioned, we do so through engagement with the community and also by reference to our own strategic plan, which we develop in consultation with our Council. Our Council has on it a very wide range of stakeholders indeed. We have the Director of the British Museum on the Council, an eminent archaeologist and a representative from the Victoria and Albert Museum. We take very broad soundings about what are the areas of urgent need and also intellectual urgency, the measuring of that need to conserve against what is actually intellectually exciting, which is what the Research Council is set up to fund. Through an iterative process of discussions with the community, engagement with stakeholders and other relevant research councils, we identify a set of strategic priorities.

Professor Richards: The EPSRC takes its strategy from two advisory bodies: the User Panel, which is mainly populated by people from industry, and the Technical Opportunities Panel, which is mainly academics but with some industrial participants. They provide advice to the Chief Executive, which is relayed to our Council which then determines the strategy or the adoptions that we put in from it. Can I say again about this meeting towards the end of this month, *Preserving our Past*, that it is designed to look at the strategic imperatives in this area for the future and what research councils can do.

Professor Grant: I applaud everything that has been said about responsive mode and the intellectual case for competition in terms of research excellence, but there is an underlying question, which is: what is the volume of funding that is going to be available to support conservation science for the future? The framework within which we are all operating is one of declining funding. We point out in the evidence from UCL the very sharp fall in European funding, for example from £28 million in FP5 to £7 million in FP6. The need seems to arise in my mind not for international strategy but for a clear indication of the

way in which the research councils would go about funding the research that this needed to underpin the conservation strategy. Responsive mode I think is absolutely right up to a point but some more directed funding would be essential were you to wish to have a national conservation science strategy that would work.

Professor McEnery: One last point I might make then is that at the moment the AHRC is doing a comprehensive review of its postgraduate funding, very much with questions such as the ones Malcolm Grant has raised in mind. Might it be the case that we could identify strategic priorities for postgraduate investment in conjunction with universities and subject associations and then provide adequate funding for those particular areas? Also, we liaise closely with English Heritage of course and that has a very good track record of identifying particular market needs. We are on a working panel with them at the moment looking at the built heritage of the nation and the needs that might exist for post-graduation in that area.

Q76 Lord Broers: Could I ask Dr Richards: do you have a member of the user panel that you would consider to be in this area?

Professor Richards: No, we do not.

Q77 Lord Broers: It would be a good idea, would it not?

Professor Richards: If it was a major part of our programme, yes. We are trying to get members who reflect our current priorities and strategic policy.

Q78 Lord Sutherland of Houndwood: I do agree about the importance of responsive mode. That is how you drive excellence, but there is a particular issue because of the size of the area and also because of the constituency. This is why I think the issue of responsive mode or otherwise ties back to ring-fencing. In the AHRC, if you really were to be funding scientific research in this area, the proportion of your budget would look enormously high, although it might be peanuts to your colleagues in some of the science research councils. This causes all sorts of problems that I am sure you are aware of, not least in the community, where it is said, "These damned archaeologists are again getting all the money" and there is a selling job. Also, the ring-fencing issue I think will be raised because you can cut out an awful lot of literary and historical projects with one large project in this area. Do you have a strategy on handling that?

Professor McEnery: The strategy on handling that I think would have to be, firstly, to work across the

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research councils. I think that is where the capacity for funding such projects would come, and so if there is exciting science in a grant, we would turn to a science council to get that funded. We would be doing this championing rather than just necessarily funding everything which happens to fall within this area. Secondly, if there are particular needs (say it is felt by this committee that there are particular needs for investment in certain areas) then it may well be the case that that would inform a spending review bid from whichever council actively had the major impact from such a decision.

Q79 Lord Sutherland of Houndwood: Would the science councils listen when you say that this is jolly important?

Professor McEnery: They are all joining us at the end of the month.

Q80 Lord Sutherland of Houndwood: You hope they will listen?

Professor McEnery: They are listening and they are putting money on the table in order to fund these networks. I have the utmost respect for my colleagues in the science councils, largely because they are very much willing to listen to the contribution the arts and humanities have to make and they are also more than happy in an area such as this to allow the arts and humanities to take the lead or champion.

Q81 Lord Redesdale: In some areas the EPSRC sees capacity-building as a critical part of its role, for example on sustainability it has managed programmes. How do you decide on the capacity in such areas? There is a particular question in this area. We have taken evidence that there is a demographic problem. With a lot of people retiring, there is going to be a loss of skills and there are not any people coming through to fulfil them, so there could be, in a short period of time, almost a crisis.

Professor McEnery: I will make a short remark and then pass to Randal. As I have indicated, we try to engage with the major stakeholders in this area and crucially English Heritage, who have something of a duty of care for identifying labour market shortages which impact upon heritage, and also of course with the British Library that has a similar remit. We do very actively engage with them and listen to what they have to say. In terms of providing training grants, for example for postgraduates, at the moment we are slightly worried about doing that while we have a major review of our postgraduate programmes going on, but that would be our intended goal in the future.

Professor Richards: We define where there is a need for capacity building by: international reviews, which are held roughly every five years in particular subject fields, the most recent one being physics, which reported earlier this year; our strategic advisory teams who point out where there is a need for additional capacity or there is a weakening research effort in particular areas; the Technical Opportunities Panel; and the User Panel. We have taken steps over the last two years because EPSRC identified several areas where future research capacity in the UK would be compromised in strategic areas. We introduced what are called Science Innovation awards. There we start new research groups paying for new academic staff for up to five years based on the proposal that the universities put forward. On Monday we had the most recent call for this year's science innovation awards. It focused on five areas. I am afraid none of them, Chairman, is in this area with which you are concerned. Those have been identified, as I have said, either by international reviews, looking at the demographics and if you like doing some future casting on what is going to be needed in the future.

Q82 Lord Redesdale: May I take that a bit further? You have said that there have not been any in this area. One of the issues that we have taken evidence on is that there is a great deal of concern in this area but it seems that there is not any leadership to find out where the holes are because it seems to fall between different organisations such as DCMS, English Heritage and the British Library. As you said yourself, it is more of a cobweb than a network. Who would undertake the research to find out where the holes are?

Professor Richards: I would bow to my colleague there.

Professor McEnery: We are certainly trying to do it in conjunction with English Heritage, which has a very good system of identifying holes that are relevant to the area in which they have stewardship. We very actively talk to them about that and they sit on groups in which we try to manage the prediction of new researchers, or even field workers, who might be able to assist in pasting over those holes.

Q83 Chairman: Does that not unnecessarily bias, though, your view towards the immovable heritage—how about moveable heritage?

Professor McEnery: That is with English Heritage. We also talked to the British Library as well. I think they are major proprietors of moveable heritage within the country. Of course, the British Library, as I think they say in their evidence to this committee, is very active in terms of trying to identify particular needs

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which they think that particular sector of the moveable heritage industry might experience.

Q84 Chairman: And the museums?

Professor McEnery: We liaise with the Museums, Libraries and Archives Council. We have a very good concordat with them and we listen to what they have to say. We have twice-yearly meetings at which matters such as this are discussed.

Q85 Baroness Finlay of Llandaff: Obviously this will not be a very solid answer but I want to ask you what is going on in the rest of Europe, particularly the new EU partners which were in eastern Europe, whether the skill base there has been strategically developed and whether there is a research background going on into those who work in conservation in those areas?

Professor McEnery: It is anecdotal evidence in the sense that I was talking to some eminent archaeologists recently who expressed the view on the capacity of eastern Europe to engage with research questions of this sort. Their view was that the type of scholarship being undertaken in eastern Europe is rather out of date, certainly not science-based and rather taxonomic in its approach. They will make long lists of pots that they have dug up at a particular location and they view that as the output of their research. I do not think that the east of Europe might provide the supplement to the skills base that we particularly need in this area.

Q86 Baroness Hilton of Eggardon: In determining your strategy, such as it is, there are clearly other considerations like cultural, economic and so on when you are considering whether to award research grants. To what extent do you take into account the fact that archaeology, for instance, and tourism are dependent very often on public reactions to them? Is this something that is taken into account in allocating strategic funds?

Professor McEnery: I think it was that realisation that led the AHRC to put museums and galleries, for example, at the core of its strategy. We do realise that museums and galleries give us a rather marvellous opportunity to disseminate and also to engage in knowledge transfer with the general public. We also strongly believe that they are vehicles through which we can improve the economic states and the intellectual and social states of the nation. There are many good examples which can show where we have actually achieved that: for example the Raffael Exhibition in London which was underpinned with AHRC research funding; or the Mitchell and Kenyon film collection, again which was underpinned with AHRC research funding, both of which had positive impacts on the economy and also very notable social and cultural impacts.

Q87 Baroness Hilton of Eggardon: Professor Richards, you are in a more pure science field, are you not? To what extent do you take account of this?

Professor Richards: We try to take account of it particularly when a research proposal goes out for refereeing. There are specific questions in there which we ask: what is the impact of this research going to be; and is the list of beneficiaries that we ask the applicants to identify—and beneficiaries includes business, other researchers and societies—applicable and achievable? Again, when a grant is finished, they have to send in a report. Those questions are then asked on the report form and sent out to referees and again evaluated to see whether the research impact desired has been achieved; what is the scope for knowledge transfer to business; and has due advantage been taken of disseminating not just through scientific journals but through making outreach programmes to the public? EPSRC also has three senior media fellows, one in music, with the idea of taking the science of music out to the community. We also have partnerships in public awareness awards, where again people are encouraged to indulge in *café scientifique* where they talk about their science in the evenings in their local pub.

Q88 Baroness Finlay of Llandaff: Some of the written evidence we have received has called for the research councils to be charged with signposting, and signposting research traffic more clearly by providing a mechanism for knowledge transfer, technology transfer and a wider dissemination of research results to end users. What do you feel about this call for signposting?

Professor McEnery: I very much welcome it. In fact, again I think it is an example of where the evidence to the committee ran just slightly behind what the research councils are doing anyway. For example, looking at what the AHRC is just doing at the moment, we have dissemination awards at the end of our grants. We have also just announced special dissemination awards for existing grant holders. We are just about to bring in a range of knowledge transfer fellowships that will allow exactly this type of knowledge transfer out into museums and galleries, which would eventually have a public interface. We are doing a great deal. We view it as very positive. We also engage with the DTI and through their knowledge transfer networks. We think it is very important that we are engaged in this.

Professor Richards: Knowledge Transfer is an extremely broad activity for EPSRC; 43 per cent of our grants are collaborative with industry. It is not a case of EPSRC having to do more; I think it is a case of us having to do it better. We are constantly seeking new ways of getting KT improved. We have strategic partnerships with industry where they put in some

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funding, we will put in funding, and then we will make an open call in particular research areas. We have awards that are collaborative training awards where block grants of money go to the university for funding studentships, MScs, and those are collaborative with industry. They have to put a business plan forward to EPSRC every four years which is reviewed and we either make the award or sometimes increase the award based on that business plan. Our most recent pilot attempt to improve knowledge transfer is what we call Integrated Knowledge Centres where we have asked universities to come forward with proposals where there would be shared research space on the campus. Industry researchers and academic researchers would work alongside on the same problem or problems. The initial plan is to pilot two of these, one this year and one next year. The total amount of funding for each of these integrated knowledge centres from EPSRC will be £7 million. We are anticipating that the additional funding that the university should gain through their own efforts, in conjunction maybe with their own local RDAs, should total about another £7 to £8 million. Then we will review how successful that has been and, if it is successful, we will continue.

Professor Grant: From the university perspective, the whole contemporary process of knowledge transfers through technology transfer in particular is still relatively in its infancy as compared to traditional modes of dissemination through teaching and research publications, which we would still regard as our primary mission. I welcome what I have just heard and indeed would point out the underpinning that we have had now through three successive rounds of the Higher Education Innovation Fund. That is starting to inculcate within universities a greater culture of reach out to the private sector, and also an understanding that some discovery is best advanced through commercialisation as opposed to publication and peer review journals. This is quite a significant cultural turnaround which will take some time for us to advance. The work which the research councils are doing is welcomed and its particular application for conservation science I think is very important indeed.

Q89 Baroness Finlay of Llandaff: Can I pick up on that because we did have evidence from Bristol referring to the Sustainable Masonry Construction Network where they were keen to disseminate their university research to the wider community who were directly involved in trying to preserve the nation's heritage. They commented that really there were just too many hurdles and the process of preparing the submission was so great. I wonder whether for bits of money that may be relatively small the process of putting forward a whole business case and going into

competition may just be a very large hurdle for a very small research group with one or two key findings?

Professor McEnery: I would agree if the sums of money involved are small. Certainly the AHRC for its dissemination awards at the end of a grant does not require many hurdles to be jumped; it is pretty much a one-pager that has to be filled out. With our recent distribution of additional dissemination awards, we went so far as simply to write to universities and say, "Would you do this type of dissemination from your research grant for the wider public, and, if so, we will send you the cheque". We simply wanted them to say yes in that case. We really do work very hard at trying to bring down those barriers.

Q90 Lord Paul: The AHRC has recently granted analogue status to a number of national museums and galleries. The Natural History Museum has longstanding analogue status with regard to EPSRC. What are the factors that influence such decisions and what is your response to the view of the Institute of Conservation Science that analogue academic status for museums, et cetera, with EPSRC is desirable?

Professor McEnery: I can tell you the criteria we use to identify academic analogues. Maybe I should say that the reason that the AHRC has only just identified museums and galleries for academic analogue status is that, in our previous legal incarnation, the HRB, we were unable to spend any of our funding outside HEIs. As soon as we were able to do so, we opened up the academic analogue competition and focused it on museums and galleries. When they apply, they have to demonstrate a number of things—for example that they have a critical mass of researchers. They also had to identify how they receive research funding and satisfy us that they did not themselves give out research funding. In other words, we did not want to fund other research funders. There were issues like that which we took into account, and also they had to be not for profit. Within those broad parameters, we welcomed all comers. What happened in our process was that we then got a range of applications from these organisations. Some were successful because they were well written and well-founded proposals. Others were unsuccessful because we thought they were probably well-founded but, on the basis of the written evidence we received, we did not feel confident in awarding them academic analogue status. In that case, we provided them with lots of support in terms of allowing them to re-submit. Also, my Associate Director for Research, Chris Millward, has been talking with them and trying to coach them on how to produce the type of document we want to see; in other words, there has been a sort of knowledge transfer at that level. Also, at least in one

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case, we decided that the most appropriate way forward, and we agreed this in conjunction with the body, was to go for co-funding because they were actually a funder. It is quite a supportive and inclusive process but even those organisations that have been excluded for the moment have generally an open invite to return and positive and supportive comments made to assist them in that process.

Professor Richards: EPSRC awards academic analogue status to those bodies which are engaged in research and are not for profit. They can only apply for what is called target mode funding. They cannot apply for responsive mode funding. That is the current situation.

Q91 Lord Paul: This is a question to Professor Grant. As Vice Chancellor of a major research university, what is your sense of the degree of collaboration between university researchers and the heritage sector, including English Heritage, National Trust and national museums and galleries and the quality of the resulting research?

Professor Grant: I think the picture is rather a mixed one. For a number of the institutions that my colleagues have just referred to as institutions with analogue status much of their preoccupation is with their own collections. It is really quite inward-looking and the degree of collaboration with the universities is quite limited. The National Trust and English Heritage, on the other hand, have commissioned university research from time to time, and I think really with very good results. I would point to a recent and quite exciting commission that the Mellon Foundation brought to UCL together with the British Library, for example. I anticipate that that will develop very significant results, but otherwise the short answer to Lord Paul's question is that it is pretty mixed and it is faltering, I would argue for the lack of a clear strategy for conservation science.

Q92 Chairman: Professor Richards, can I come back to the question that Lord Paul put to you but that you have not directly answered, which is: the Institute for Conservation Science feel that it would be advantageous for some of the museums to have analogue status with the EPSRC as well as with AHRC. I wonder what you felt about that issue.

Professor Richards: We do award grants to museums, quite a range of them including the V&A in London and the London Museum. I am prepared to look at the Institution for Conservation Science. As far as I know, they have not approached me directly. They may have approached EPSRC in the past and they have not come back again. I should say that the question of analogue status is being actively debated between the research councils and OST at the

moment, with some definitive ruling being expected or being developed within the next month or so.

Q93 Chairman: The issue is that the Institute for Conservation Science feels that the museums themselves should have analogue status and, as you say, some of them have.

Professor Richards: Absolutely, and I have the list: the National Museum of Scotland, the Museum of London, the Science Museum, the British Museum, and the V&A. We have awarded grants to them, so they must have analogue status.

Q94 Lord Broers: The written evidence from RCUK refers to the decline in museum-based science, along with the increasing complexity of the basic science underpinning conservation, and notes that it may become increasingly difficult for organisations conducting cutting-edge research, such as CCLRC, to engage with museums. What can be done to bridge this gap? Given on the one hand the falling budgets for museum-based science and on the other the need for university-based scientists to publish international standard, peer-reviewed research papers, in order to meet the challenges of the Research Assessment Exercises, is there a risk that the applied science of conservation will simply fall between two stools?

Professor McEnery: We certainly would not want that to happen. The evidence that we receive, which we have reported to you, is largely anecdotal, I must say, about the decline of museum-based science. However, there do seem to be some clear indications that it is probably true. What can we do in order to reverse it? In a way, we have started the process. We are trying to engage the museums with HEIs through Research Council funding in order at least to ensure that the capacity to work with those collections in some way, whether that be in the HEI sector or the museum sector we might be blind to that issue, is maintained and indeed enriched. I think in the long term the engagement of the CCLRC with this issue is particularly interesting, and again analogue status I suppose is particularly welcome here because they can provide the very expensive centralised facilities which would allow much conservation work to be undertaken, certainly cutting edge conservation work. From the point of view of the Research Council, the more we facilitate interaction, the more we facilitate collaborative research. The more we take the museums and galleries under our wing, to use that rather patronising image, the better to ensure that we have the capacity somewhere in the system to undertake this research, and also in technical and scientific terms to ensure that people have access to the best facilities probably through the CCLRC.

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Q95 Lord Broers: Might I address to Professor Richards: we have evidence from the University of Bristol referring to the reluctance to fund projects which are not seen as being at the cutting edge of modern technology. Is this a general perception, and is it justified?

Professor Richards: I do not know to what particular projects you are referring. I was thinking earlier about the question in relation to CCLRC. I think part of the difficulty there is that maybe the conservation scientist or the people who are interested in conservation do not know what facilities are available at the central facilities. For example, if you want to find out where water is in something, there is nothing like neutron scattering; it will certainly tell you where it is, and it will penetrate anything. EPSRC will gladly fund people to do that sort of research if it is shown to be excellent in competition with other proposals in front of the panel at the same time.

Q96 Lord Broers: It is just a matter of getting out to people that this sort of interaction is rewarded. I was very pleased to hear what you said about Mike Brady. That is the sort of thing. Mike Brady would not have won kudos at his expertise conference necessarily for doing that sort of thing.

Professor Richards: That is right. Somehow, we have to engender a cultural change that not necessarily every aspect of every research proposal has to be leading edge excellent; it is the totality that you have to look at that is new and innovative.

Professor Grant: But Lord Broers did cast a long shadow over the proceedings by referring to the Research Assessment Exercises.

Lord Broers: I would agree with Professor Grant on that but it is not the subject for today.

Q97 Lord Sutherland of Houndwood: We understand, and I think we were a bit disappointed in principle, that there has been a recent European-wide PhD programme related to conservation. The disappointment was that Britain is not participating. Why? Is there an alternative strategy?

Professor McEnery: Are you referring to the programme run through the ESF?

Q98 Lord Sutherland of Houndwood: Yes.

Professor McEnery: Our engagement with the ESF tends to be moderated by our expectation of grants being made to UK researchers or academics. It is often the case that these programmes do not work on the basis of *juste retour*, for example. We have many relevant examples showing that when the British contribute to such programmes, it turns out to be a very bad deal for Britain. A good example would be the EURIAD programme, the European Union

Investigators I think they were called, where a couple of UK research councils did subscribe and the UK did not get a single grant. The reasoning behind that or the actuality behind it, to use a Frenchism, would be that when you looked at what happened, there were plenty of similar grants available within the UK and they mopped up the best UK applicants. Then, when it went into a European context, those countries which did not tend to have such active research councils or provide this type of grant put forward their very best candidate for that type of grant. If we were being terribly neighbourly and saying that we wanted to support all of our European neighbours in this endeavour, we may well have decided to contribute to that programme, but if we were looking to domestic links and certainly domestic demand, it might have been unwise to contribute to such a programme.

Q99 Lord Sutherland of Houndwood: Is there an alternative running in the UK?

Professor McEnery: The alternatives would be our existing responsive mode programmes in which conservation and heritage, for example just within the AHRC, do quite well indeed.

Q100 Lord Sutherland of Houndwood: We keep hearing about the concerns about restocking the workforce.

Professor McEnery: I can reassure you that we are talking to English Heritage, British Library, et cetera, trying to identify these lacunae, but at the moment we are also engaged in this major PG review so there will be something of a planning cycle for a year or so while we re-forge our vehicles.

Q101 Baroness Finlay of Llandaff: Can you clarify whether you have a specific PhD and post-doc programme and taught Masters programme separate to the research funding programme?

Professor McEnery: Yes. In fact the Arts and Humanities Research Council is quite unusual in that we put quite a high proportion of our funding into post-graduate training. We fund one, two, three year Conservation Masters, for example, through our responsive mode grant-giving to post-graduates. We also fund PhDs in the area. Last year we funded 36 post-graduate awards which we think are very relevant to conservation.

Professor Richards: The EPSRC awards its post-graduate studentships in a rather different manner. We award to universities what are called doctoral training grants and we then in principle leave it to the universities to decide how they will deploy that money and what areas of studentships in the engineering and physical sciences area they wish to support. Similarly I mentioned the collaborative

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training grants, that again is based on the business plan the universities put forward which will fund their MScs or knowledge transfer partnerships. There is one other form of studentship that the EPSRC has and that is called a project studentship, where you can place the studentship on a grant application, and that studentship has to be associated intimately with that research proposal. Perhaps Malcolm might like to comment on the use of doctoral training grants. They vary from university to university in the way they are deployed.

Professor Grant: I have to say they have been a fantastic injection of resources into universities and they are used right across the board. They are available for work in conservation science, were that to be identified as an area within a university to which to apply funding.

Q102 Baroness Finlay of Llandaff: One of the difficulties is that funding is a huge lever; as the funding goes in and you leave it up to the department,

the department will probably carry on with its own particular interest rather than actively promoting conservation.

Professor Richards: We award grants to the university. If the university chooses to delegate that down to the department, that is part of their strategy, but we trust the universities to use them sensibly and wisely.

Chairman: I must draw this to a close and in doing so can I thank the three of you very much indeed for coming and sharing your thoughts with us. We have been pushing you quite hard on a number of things, but I think you will recognise that we have got some concerns in this area. If there are any points which have arisen in terms of the issues we have discussed which you would like to add to with further written comments, please do send them in, they will be published alongside the transcript of this session. You will also be receiving a copy of the transcript for you to have a look at before it is published. Once again, I would like to thank you very much indeed, we are most grateful to you for giving your time and coming to see us.

Memorandum by the Institution of Civil Engineers

INTRODUCTION

1. The Institution of Civil Engineers (ICE) is a UK-based international organisation with over 75,000 members ranging from professional civil engineers to students. It is an educational and qualifying body and has charitable status under UK law. Founded in 1818, the ICE has become recognised worldwide for its excellence as a centre of learning, as a qualifying body and as a public voice for the profession.

CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

2. ICE members are involved in research at universities and in other research facilities in the UK. Heritage agencies such as English Heritage, Historic Scotland and Cadw are not proactive in liaising with university engineering departments to stimulate greater research activity in the conservation area. In a recent report to identify research priorities, in conjunction with nCRISP and ICE, the re-use of existing assets and whole life value/costing were identified as priority areas. Both of these are dependent on sound conservation science. ICE's R&D fund is now typically funding one "historical" research project a year to encourage interest in the field.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

3. Around 50 per cent of the work in the construction sector is concerned with maintenance and repair; given this the resources being devoted to research and encouraging good practice in conservation are *prima facie* inadequate. The situation is not helped by the fact that conservation science falls between two research councils: Arts and Humanities Research Council and Engineering and Physical Sciences Research Council, and may not be prioritised by either. Some overall ring-fenced element could address this. Civil engineers are often concerned with the conservation of large structures, whereas conservation science may focus on the micro-elements. In that sense typical UK conservation courses include very little in the syllabus on specialist engineering skills.

4. ICE was instrumental in establishing a conservation accreditation register for engineers (CARE) to identify British engineers skilled in the conservation of historical works and sites. It was established partly in response to requests by potential clients and their sponsors and partly to encourage excellence in this increasingly important topic. Registered members must have an appreciation of disciplines and interests well beyond their core professional training. One of the competencies that must be demonstrated includes the ability to identify and assess the cultural, historical and social significance of the structure and site to be conserved. More generally ICE are supporting the EC UK requirement that UK undergraduate engineering courses should include an awareness of the history of technology.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of cultural heritage, and to assist in its conservation?

5. The ICE's Panel for Historical Engineering Works maintains a database of historical engineering works, and panel members regularly inspect, record and research relevant structures. The Panel have specialist sub-panels with expertise regarding types of structures, who provide advice to bodies such as English Heritage when invited to. The recording work of the US Historical American Engineering Record is a model in this regard.

6. At the recent (January 2006) launch of the DTI's Knowledge Transfer Network for Materials, the Network Rail contribution made it clear that more research needs to be done with smart materials before they can be reliably employed in structural health monitoring. A review of the international journal *Structural Control Health Monitoring* suggests that the US, Japan and continental Europe carry out the majority of research in this field. There are no UK representatives on the editorial board.

Is there a satisfactory process to develop practical applications of conservation research for the market?

7. It can be argued that conservation research is only disseminated among conservation professionals, and that non-specialist engineers and architects are excluded from the findings. There is evidence that projects such as the English Heritage Monuments Protection Programme (MPP) have remained buried internally despite their widespread relevance for conservation professionals. Internet publication of such grey literature would help.

8. English Heritage are currently developing guidelines for science on historic archaeological sites and ICE would welcome their widespread dissemination.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

9. Conservation science can be incorporated imaginatively into interpretative material to show how paintings have deteriorated or been faked. Similarly in the case of structures, buildings can be analysed to show how the use has been changed and developed over centuries. Subsequently the public can gain an understanding of how engineering works.

10. There is a need for better understanding of civil engineering within the museum sector. It represents an important sector in the development of the UK, yet it is seriously under represented. Large scale objects are frequently relegated to relatively inaccessible stores, where conservation is less likely. The examples of the Westfälische Industriemuseum and Deutsches Strassenmuseum (Gemersheim) show what can be done with large scale industrial preservation and technical museums.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

11. IT offers the potential, particularly using web-based technology for multi-user access to material without compromising conservation. Most material can be 'scanned' and digitally stored to enable virtual copies to be displayed. Technology can enhance and interpret these copies to make the study of the original redundant for many. Investment in such technology can reduce public concerns about geographical concentration of originals in a handful of countries.

12. The use of scanning technology has raised issues about damage in the process. For most material this will be outweighed by reducing the need for ongoing handling.

13. In some cases the best “IT” solution may involve the disbinding or even destruction of the original. This may be acceptable where multiple copies were available, through consortia or otherwise. The ICE and other engineering institutions have adopted this approach in digitising many of their own publications for web access back to their origins in 1836.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

14. ICE is currently investing in turning page technology to enable web-based access to virtual archives. Such technology can be best exploited on a consortia type basis to build up a credible archive for scholars and members of the public.

15. A number of publicly funded “union” catalogues of resources have been developed such as A2A, A1M, Cornucopia. Such resources must be open to search tools generally used by the public at large rather than archive professionals, eg, Google. At present it is by no means clear that these catalogues are effective. The choice seems bewildering, and the links to further e-content are disappointing.

16. There are a number of prominent galleries that have very restricted image collections available online. This could be relatively easy to replicate.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

17. The Natural History Museum are developing palm held e-guides which offer considerable potential for galleries, etc., with a large through put of visitors who are likely to justify the necessary investment. Such technology can combine audio-commentary on artefacts with interactive displays and hot web links to external resources.

18. In France there is a network of sites (Sitalia 17) with contact numbers on plaques which one can telephone using mobile phone technology and obtain a commentary.

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Memorandum by the Society for the Protection of Ancient Buildings

The Society for the Protection of Ancient Buildings (SPAB), started by William Morris in 1877, is the founding father of the building conservation movement in the United Kingdom. The Society played an important role in developing historic building legislation. Perhaps more significantly its “philosophy” of repair has helped fundamentally shape the UK approach as practised by local authorities, English Heritage, bodies like the National Trust, and building professionals.

Today the Society is an educational, advisory and campaigning voluntary organisation. The largest of the national amenity societies it is notified of listed building applications for demolition in England and Wales. The Society has a unique record on conservation training, provides a free technical advice line, and issues advisory publications.

The Society has just under 9,000 members including those who belong to the separate Mills Section. They comprise leading historic building professionals, whose cumulative expertise is given voluntarily to the Society; as well as homeowners; and those who support the cause. The SPAB Technical Panel, made up of highly experienced architects, surveyors, engineers, builders and others, oversees the Society’s technical activities.

1. CONSERVATION SCIENCE

1.1 *Role of Conservation Science:* The SPAB’s experience over the past 129 years indicates that science can play a practical role in helping to conserve our built heritage providing that it is applied with care, in accordance with the principles of good building conservation practice. These principles were first set out in the SPAB’s Manifesto in 1877 and have subsequently been adopted around the world. They include the concepts of minimum intervention, reversibility, and repair rather than replacement. There are often appreciable differences in the approach followed when conserving buildings compared to that favoured for the conservation of other aspects of our cultural heritage, such as works of art and museum artefacts. These differences should be respected.

1.2 *Theory versus Practice:* The SPAB’s experience is that some new products that appear satisfactory in theory or laboratory tests—and may even genuinely be perceived as panaceas—can perform inadequately in real life when applied to old buildings. At worst they may be highly detrimental. Examples range from the widespread use of hard Portland cement mortars from the 19th century onwards to, more recently; the

insertion of block resin repairs in timber-framing; the application of silanes to eroded masonry and, at Hardham Church in West Sussex, irreversible treatment using soluble nylon on the finest medieval wallpaintings in the British Isles. Because actual site conditions and practices are hard to replicate artificially, extreme caution is needed before testing new methods and materials on old buildings.

1.3 *The Need for Old Buildings to “Breathe”*: To repair an old building effectively it is essential to understand how it is constructed, including how it differs from its typical new counterpart. This applies also if old buildings are to be successfully adapted to meet modern requirements, such as the latest standards of thermal insulation, without simply turning them into warm, damp environments. Whereas modern buildings generally depend on an impervious outer layer and cavities to keep out moisture, old buildings tend to rely on their permeable nature (“breathability”) to allow water absorbed by the fabric to evaporate back out—the “raincoat” and “overcoat” effects respectively. Comprehensive research is required on the exact ways in which old buildings perform, including patterns of moisture movement within them and alternatives to modern practices, such as retrospective damp-proof courses, water-repellent solutions, spray-on roof foams and double-glazing, that can do more harm than good by sealing fabric that needs to “breathe”. The confusion concerning the long-term implications of incorporating modern “breather” underlays into roofs needs to be clarified, as do the wildly conflicting claims over the relative vapour permeability of modern and historic paints caused by inconsistent test procedures.

1.4 *The Structural Flexibility of Old Buildings*: Old buildings also differ from new ones in their ability to accommodate minor movement. For example, unlike modern dense, cement-rich mortars, the softer lime mixes used historically were “autogenous”, allowing any fine cracks that developed to self-heal. Despite this, structural engineers are often reluctant to specify materials such as lime due to the lack of technical data and instead opt for less appropriate solutions that introduce too much rigidity into historic structures. Additionally, older structures cannot be “calculated” in the same manner as modern buildings. In fact, standard engineering principles not infrequently suggest that sound historic buildings that have existed without concern for hundreds of years are on the point of collapse or should not be standing at all. Each year numerous old buildings are condemned as being “beyond repair” for no good reason or subjected to unnecessary work such as underpinning. Much could be done to address this situation.

1.5 *Decay Mechanisms*: The circumstances affecting the deterioration of many building materials and components, as well as ways of treating damaged fabric, are still inadequately understood. This poses difficulties for practitioners in many fields of building conservation, ranging from the conservation of stained glass to stonework conservation to give just two examples.

1.6 *Sustainability*: The repair of partially damaged fabric rather than its needless replacement is not only good building conservation practice but also preferable in environmental terms. Every year thousands of wooden windows that people mistakenly believe to be beyond repair are replaced unnecessarily, frequently with uPVC. At the same time the development of more environmentally-friendly solutions to problems such as timber decay should be pursued. There is at present an over-reliance on quick-grown, poor quality softwood that has to be chemically treated and a great deal more could be done to encourage the sustainable production of timber with a greater natural durability. Furthermore, additional research aimed at aiding us better understand and tackle the causes of timber decay and infestation in buildings is urgently needed. The widespread current practice of spraying timbers with minor evidence of beetle attack each time a house changes hands is environmentally damaging and merely treats the symptoms. In the worst cases, an attack has long-ceased to be active and old beetle holes are simply being re-sprayed periodically without justification.

1.7 *Funding*: Although some work is undertaken by Historic Scotland and English Heritage, little, if any is carried out by Cadw in Wales as far as we know, and conservation in the UK generally is undoubtedly a poor relation in terms of research funding. Where research projects have been implemented the findings have not always been fully disseminated, as with the results of English Heritage’s “Smeaton Project” into the performance of different mortar mixes which to this day remain to be fully published.

1.8 *Sources of Advice*: Members of the public are often unaware of where to obtain impartial advice on repairing old buildings. They remain at the mercy of “cowboy” builders and unqualified “professionals”, with the UK lacking the capacity and skills base to properly maintain its cultural heritage for future generations. The SPAB runs a technical helpline open to all, although our limited resources mean that the hours of operation have to be restricted to weekday mornings. In addition to administering independent advice, we are also able to suggest the names of suitable specialists to enquirers over the telephone. Better funding of this service would assist in improving the overall standard of conservation nationwide.

1.9 *Public Engagement*: There is huge potential for conservation science to raise public awareness and enhance the understanding of historic building methods and materials. Homeowners spend many thousands of pounds each year fitting out kitchens and wet rooms, for example, yet neglect basic maintenance, such as

the clearance of a blocked gutter that is causing extensive damage to a wall. For the past few years, the SPAB has run a National Maintenance Week to highlight the importance of good upkeep and to explain how this may save both historic fabric and money. This is a message that needs reinforcing.

2. USE OF INFORMATION TECHNOLOGY

2.1 Role of IT: Although IT can contribute to enhancing public engagement with the cultural heritage (for example, where physical access for the disabled is unrealistic), caution should be exercised to ensure that it does not become a ready substitute for the real visitor experience. In particular, IT can play a valuable role in recording historic buildings but the SPAB is alarmed by the view in some quarters that this could somehow justify a higher number of demolitions (“preservation by record”).

Examination of Witnesses

Witnesses: DR BOB MCWILLIAM, Member of the Panel for Historical Engineering Works, Institution of Civil Engineers, MR IAN PRITCHETT, Member of the Technical Panel, Society for the Protection of Ancient Buildings and MR IAN BROCKLEBANK, Chair, Technical Sub-Committee, Institute of Historic Building Conservation, examined.

Q103 Chairman: Welcome and thank you very much for coming. Would you like to start by introducing yourselves? I do not know whether any of you would like to make any statements before we begin on questions or whether you would like to go straight to the questions?

Mr Brocklebank: I am Ian Brocklebank, representing the Institute of Historic Building Conservation, and I chair the Institute’s Technical Sub-Committee. The Institute is a multi-disciplinary institute of professionals working within the historic built environment. We have planners, architects, engineers and a whole range of allied professionals. I believe we are the only multi-disciplinary organisation which covers the whole of the UK in our field.

Mr Pritchett: My name is Ian Pritchett, and I am here representing the Society for the Protection of Ancient Buildings, and I am a member of their Technical Committee. If opportunity allows, I would like to make a brief opening statement.

Q104 Chairman: We will come back to you in a moment.

Dr McWilliam: My name is Robert McWilliam, I am here representing the Institution of Civil Engineers. I do not know whether the Committee would like a brief description of the Institution for those who are not engineers or do not know the work of the Institution. It is a UK-based international organisation with over 75,000 members ranging from professional civil engineers to students. It is an educational and qualifying body and has charitable status under UK law. It was founded in 1818 and has become recognised worldwide for excellence as a centre of learning. Members of the Institution are responsible for not only the design, project management and construction of things like bridges, roads, harbours, tunnels and flood protection works but also for their maintenance. This huge legacy and its history is our main concern with this topic. Personally, I have been a member of the Institution

for over 30 years and at present attend its Archives Panel and Panel for Historical Engineering Works, and as such I hope I can act as a spokesperson for fellow members but naturally I do not have all the detailed knowledge which is likely to be asked for this morning.

Q105 Chairman: Thank you very much. Mr Pritchett?

Mr Pritchett: Thank you. I just wanted to start by saying that from the Society for the Protection of Ancient Buildings’ point of view we believe heritage represents centuries of accumulated wisdom and empirical trials. Over the last 50 years those empirical trials and that accumulated wisdom have largely been replaced by modern high-tech solutions, and in the modern climate of standards, ISO regimes and litigation it means that professionals working in the building conservation sector have a burden of proof on them to have an audit trail, and unless they uniquely happen to have specialist knowledge they need to rely on standards and published data on materials. A lot of that does not exist on historic materials and historic techniques because of this accumulated wisdom over the years, but it is very easy for new products to spend very small amounts of research, generate a little bit of data and then offer something which fits the bill of professionals repairing historic buildings. We believe there is actually a need to carry out research into the performance of traditional materials, both individually and as composite structures, as well as research into the repair techniques to try and counter some inappropriate modelling materials.

Q106 Chairman: I have one question for Mr Brocklebank from Lord Redesdale who unfortunately was unable to stay and be with us. He asks whether your Institution is thinking of joining forces with the Institute of Field Archaeologists.

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Mr Brocklebank: The IHBC does work with the Institute of Field Archaeologists and we have very cordial links with them. There have been several discussions about joining forces, exactly how far they have gone, I do not know.

Q107 Chairman: Thank you for that answer. What I would like to ask all three of you, if I may, is what is your perception of the quality of knowledge transfer between the research communities and practitioners—the engineers, designers and others—dealing with the built environment?

Dr McWilliam: The quality is not the issue really, I think probably the quantity is the concern because we are aware quite a significant amount of research is being undertaken which is not being published. Perhaps that angle might be pursued by fellow members on this group.

Mr Pritchett: From my own point of view, I believe at the upper levels there is a reasonable exchange of information between academics and practitioners who have an academic interest, but below that level I think the transfer is fairly poor for the average layman working on historic buildings; there is very little dissemination of research information.

Mr Brocklebank: I fully agree with that. There is a core group of people who are self-motivated, who find out a great deal about conservation and become very good at it, but outside that particular field dissemination is very poor indeed.

Q108 Chairman: Is the development of practical applications of research co-ordinated or just left to chance?

Mr Brocklebank: Left to chance, substantially. It is about the interest of individuals who choose to pursue it on a particular project basis.

Q109 Chairman: Some of you were here to hear the evidence we had before from the Research Councils. Do you feel in this respect the Research Councils ought to be doing more to try to disseminate knowledge to organisations like your own?

Mr Brocklebank: It is difficult to see who should be doing it. We would like to find out a lot more about it because most of our members are very keen to understand this research and to use it. It tends to be published in quite rarefied, academic journals which are not necessarily very accessible to our members working in a practical environment, unless they have a problem which is of sufficient significance to justify them putting in the research effort to find out what is out there.

Mr Pritchett: I was not here for the previous evidence but I have to agree with my colleague here really, that it is out there but sometimes in obscure journals. The sort of journals which tend to filter down to the building conservation industry where people have a

real thirst for knowledge are publications such as *The Journal of Architectural Conservation* which comes out I think quarterly and carries some very good articles, but that is really the tip of the iceberg and it is only read by a very few building professionals. Even from my own point of view, I receive it every quarter but I have not read it for sometime, I have to admit.

Q110 Chairman: Dr McWilliam, the Research Councils put a lot of emphasis on dissemination and not just academic dissemination. I do not know whether you feel relations with, for example, the EPSRC are good?

Dr McWilliam: To some extent of course the huge legacy that our members are concerned with—and after all if one looks at the capital wealth of the UK in terms of manmade things, three-quarters of it will be the built environment—is the stuff which has been built, so there is a large amount of material there, and we are tending to look at a complex flow of activities in order to maintain them and maintain the heritage and this legacy of useful material extant. We would tend to look towards bodies like English Heritage, Historic Scotland and Cadw as clearing-houses for ideas coming up from the academic world, and that is where we would expect to see the flow. Whether the new approach that the DTI are bringing to the building industry with their Knowledge Transfer Network can address this issue better than the previous ones, it is still too new to comment on; it is still emerging.

Q111 Lord Paul: The commercial organisations are relied upon to develop practical applications, do issues of intellectual property and confidentiality prevent effective dissemination among the relevant professions? Have you come across any existing mechanisms for commercialising research results that actually work?

Mr Brocklebank: As far as intellectual property preventing dissemination goes, it does to a certain extent but perhaps not as much as one might think. In his opening statement, Ian Pritchett mentioned the fact that a lot of relevant research actually revolves around an appropriate understanding of traditional materials which have been used in the past. Within that field, it is also worth bearing in mind there is actually a very limited commercial benefit, simply because the conservation field as it stands at the moment is actually quite small. So there is a benefit in people having specialist knowledge and it is often available to individuals who use it on a consultancy basis and they charge their services out. It is less a case of intellectual property, it is more a case they have done the research and it has limited dissemination, simply because the commercial field is small enough for there not to be very large returns,

which tends to keep the major commercial players out.

Q112 Lord Paul: Could the commercial field be enlarged by being a little more global?

Mr Brocklebank: Yes, it could be. This again ties in with this business of dissemination from the field of specialist building conservation through into a much broader field of, typically, grade 2 listed buildings, the vast majority of buildings in conservation areas and so on. There is very, very limited access to this kind of thing. There is considerable potential for this information to be used in such circumstances but it does not get out there.

Mr Pritchett: From the point of view of commercial companies getting involved and conflicts with intellectual property, I have had a little bit of experience of this because there is a great overlap between the materials we used in historic buildings, and therefore have a place in the repair of them, and those which also have a place in the battle towards sustainable, new buildings. This is leading to some research at the moment and although the research is funded by and focused on the use of these materials in new, sustainable buildings, there is a great deal of that information which can filter back into the historic building sector as well. I think it is worth looking at other areas where there is an overlap. Most people I am aware of on a non-commercial level are very generous with their knowledge and spread it freely, but there comes a point, when commercial companies are putting in tens, even hundreds, of thousands of pounds into research, where they have to protect that for commercial reasons. I am not actually aware of research going on at a commercial level which is being freely disseminated at the moment.

Dr McWilliam: I can pick up on one or two points that Ian has made regarding the dissemination of knowledge and also about the world of ISOs and standards and so on. Our members are concerned with a large quantity of material, much of which could be conservation, simply re-using our legacy in a sustainable way, which is quite axiomatic—if a wall is to be built in the same place again, there is no need to knock it down and rebuild it providing one is confident about the state of the old wall. Most commercial products, if they are to be sold at all, probably have to be disseminated, and the process of dissemination throughout a business like construction requires a number of people to be assured of it along its product life. There are formalisation procedures for commercial products such as the British Board of Agrément which will provide objective reviews of the mechanical and chemical properties of a new product, and therefore they are disseminated amongst would-be users and encourage people to use the products. The aspect

which might be regarded as more commercially confidential is the services and, in particular, topics which would be of concern to our members such as structural control and monitoring instrumentation which goes into older buildings to make sure they are not going to move. There one does have perhaps a degree of technique which is commercially secretive, but I do not think it is a major issue that commercialisation is stopping dissemination. The main issue is trying to identify the new techniques which are coming along which should be commercialised.

Q113 Lord Broers: The Institution of Civil Engineers' written evidence notes that agencies such as English Heritage, Historic Scotland and Cadw are "not proactive" in liaising with university engineering departments to stimulate more conservation research. Why is this? What organisation or organisations would be best placed to adopt such a proactive approach to co-operation between universities, agencies and others? Perhaps Dr McWilliam might like to start.

Dr McWilliam: Like all these things it is rather difficult to prove a negative. It is based on comments from one or two members and it is being addressed but not too hurriedly, is how it seems to me. There is a body called nCRISP, which is a new construction research and innovation strategy policy group, and they have commissioned from a man called David Fisk work on heritage issues, and we are rather hoping that some of the pointers which have been addressed there will be made available. Unfortunately, this work which began in 2004 has not yet been published and we do not have a date yet for publication.

Mr Brocklebank: We do not really know why this is and why are they not more proactive. It may be simply a matter of limited resources but they certainly have a valuable role to play in this.

Q114 Chairman: Am I right in thinking that the nCRISP programme emerged out of a Foresight exercise in the DTI and it is very much being carried forward at the moment?

Dr McWilliam: It is being carried forward but I am not sure of its exact status. I tried to find out before I came here, but nobody quite knew when we could expect to see some material coming from this.

Q115 Chairman: Can I put to all three of you the fact that English Heritage published a Research Strategy in 2005, proposing to help co-ordinate a UK-wide research strategy for the historic environment and its sustainable management. What is your view of the English Heritage strategy?

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Dr McWilliam: My initial impression is that it addresses an issue which has not been addressed before, and that is the kind of sense of place aspect of English Heritage's whole mandate. At the technical level I was not aware of very much coming forward that was novel compared with what was there before but perhaps I did not read it carefully enough, I am sorry.

Mr Pritchett: I am rather embarrassed to say I have not actually read the statement that you are talking about, but I think I can throw a little light on this. Sometimes it is not so much the statutory authorities are not doing research, it is that it is not necessarily published or it is not necessarily the research that those of us on the ground want to see. The one SPAB cited in our evidence was the research into lime mortars done 10 years ago, the Smeaton Project, which is still yet to be published. By the time it is published, it will be out of date because so much more has happened since then. I would certainly welcome a co-ordinated strategy from the heritage bodies.

Mr Brocklebank: They are well placed to do something. The Institute understands that there is actually a joint workshop between the Arts and Humanities Research Council, the EPSRC, the Natural Environment Research Council and English Heritage into preserving our past. We are very interested in this; we think this is a very positive initiative.

Q116 Chairman: You have been invited to it, I take it?

Mr Brocklebank: Unfortunately not, no. We expressed interest but we were not invited.

Q117 Baroness Platt of Writtle: What is your sense of the availability of funding for applied research in the field of conservation for the built environment? What are the prospects for future funding, particularly given the current review of the arrangements governing the use of the Heritage Lottery Fund? I should just say I have not got any interests on the list but I am an honorary fellow of the ICE, but there is no money involved!

Dr McWilliam: I did know that but thank you for confirming it.

Mr Brocklebank: We are really aware of quite limited funding opportunities within the field that we are particularly interested in. It is part of this problem I think. There are limited charitable sources but they are very limited. Our sector of research into historic buildings and allied materials and techniques and so on tends to piggy-back on other research agendas because it is quite a broad field, and it may be affected by the fact that it often inherently involves both the scientific and cultural dimension which possibly means from both the humanities and the science

point of view it is slightly off-message, if you like; it does not quite fit.

Mr Pritchett: I am not aware of too many opportunities. It always seems to me in my experience of the Heritage Lottery Fund that it has focused on capital expenditure and more recently training but not actually research as such. I am personally involved in a project repairing a very major historic structure that has some serious engineering issues which need to be fully understood. Part of the repair programme which has been put forward is the recommendation that further monitoring and research needs to be done, but we have a charitable trust which owns this structure now struggling to raise that money to be able to monitor it and ensure it for the future. So there has been a lot of money put into the capital expenditure side but a line seems to be drawn in the sand beyond which nobody is too concerned about its future survival. That is my experience, that the HLF on a number of fronts looks at capital expenditure, not necessarily long-term maintenance, monitoring or understanding structural issues. It would be nice to see the HLF looking more at research, even in small low-key pieces of research into the future survival of vulnerable structures.

Q118 Chairman: Dr McWilliam?

Dr McWilliam: Again I can confirm that is the HLF seems to be looking more towards community involvement rather than the wider enlightenment arising from applied research, but nonetheless they have occasionally been interested in community-involved projects which have a little bit of side effect on there being some research, but it is very much a side issue on the large projects and not the main concern on which they are funded.

Q119 Lord Sutherland of Houndwood: I wanted to ask about the role of the professions in I suppose what we call "continuing professional development" these days because clearly there is best practice being accumulated within the system and I wonder whether the professions have a specific role in disseminating this. I do not just mean research findings but best practice as a professional and I wondered what you thought about that. Two of you at least must be customers of the professionals and perhaps the Institute is a body that is peopled with professionals. What are the professions doing here?

Mr Brocklebank: You are absolutely right, the CPD requirement obviously triggers a requirement that people should keep themselves up-to-date. It is generally a time-based requirement and the Institute has it for their members as does the RIBA and similar institutions. It is down to an individual as to what they choose to spend their time on and whether they choose to do their own research and their own

investigation and their own learning over and above the minimum time requirement. Most people in the conservation field do that but they do it from personal motivation. It is not something for which there is a formal structure.

Mr Pritchett: I find the CPD network and framework that exists extremely useful in getting the message about traditional materials and building conservation out into the architectural and surveying practices in a very, very receptive way, and I think it is a very important mechanism. It is the first step and it then needs to be backed up with hard facts because it is very easy to interest an architect in the idea of using traditional material for the repair of historical buildings, but then faced with a hard choice looking at his professional liability, has he got the hard facts to back up that data from research, if he has not he is in a very difficult position. Is he going to go with something that he instinctively feels is right but does not have the backup or does he go with something that has the backup which may not be right but ticks the right boxes in an audit trail? I think the CPD is a very, very important first step that needs to be followed up with hard facts and research.

Dr McWilliam: Two years ago the Institution of Civil Engineers was instrumental in establishing a Conservation Accreditation Register for Engineers, the rather unsurprisingly named CARE, to identify British engineers skilled in the conservation of historic works and sites. It was established partly in response to a request by potential clients and partly to encourage excellence in what we regard as an increasingly important topic. Registered members must have an appreciation of conservation interests well beyond what we regard as core professional training and the competencies that must be demonstrated include cultural awareness, both historic and social, knowledge of the significance of the structure and site to be conserved, and some element of understanding of the aesthetic qualities and values as well as the more engineering aspects of any investigation, materials and technology, with the backup of social and financial issues and implementing works within conserving engineering projects, so we are well aware of this and as this snowballs and the need for more reuse of buildings becomes apparent, we fully expect it to get busier.

Q120 *Lord Sutherland of Houndwood:* That sounds a very good innovation and it is clearly the other end of the spectrum and, Mr Brocklebank, I think you were suggesting that it is a matter for the individual what they do about getting the “Brownie points” of CPD. Are the other professions moving in this direction and as a profession taking some responsibility?

Mr Brocklebank: Yes, the accreditation process is also co-ordinated through the professions by a group called the Edinburgh Group, so called because that is

where they originally met, so the requirements from surveyors, engineers and architects and the like are co-ordinated amongst the professions as well. There are equivalent schemes for each profession.

Q121 *Baroness Finlay of Llandaff:* I would like to ask a short question following on from the previous one and then come on to my main question, if I may. Listening to you I was wondering if there was an international conservation science database where all the relevant research in conservation was lodged so that anyone could go in there and search on there to look up the techniques, findings and so on?

Mr Brocklebank: I am aware of some work having been done through ICOMOS in Canada and co-ordinated with ICCROM in Rome. Most conservation professionals do not have access to that. You need to be accredited with ICCROM or ICOMOS really to access it.

Q122 *Baroness Finlay of Llandaff:* It is not accessible?

Mr Brocklebank: Not widely accessible, no.

Q123 *Baroness Finlay of Llandaff:* There is a parallel because I am in medicine and PubMed, which anybody anywhere can log on to, is based in Washington and you can search under whatever you want and you will get a whole raft of research papers.

Mr Brocklebank: We would love to see something like that.

Q124 *Baroness Finlay of Llandaff:* It means that anybody working anywhere can get the information that they need. My main question though, if I can come on to that, is that we have had some written evidence which came from the Building Limes Forum that the UK is tending to focus on the “best of its built cultural heritage” and there is an awful lot of “medium or general significance” type heritage that is being overlooked, so we are going to risk having an environment of some superbly kept, beautiful and well-presented monuments surrounded by a sea of partly-damaged and very poorly maintained and damagingly restored ones. I wonder whether you feel that is a fair view of the future and can you comment on that?

Mr Brocklebank: I am afraid I have to express an interest in that I actually wrote that as Chairman of the Building Limes Forum as well.

Q125 *Baroness Finlay of Llandaff:* You can explain it to us.

Mr Brocklebank: It is very much to do with this issue of the dissemination of information. I was speaking to some colleagues yesterday and I am told that the National Heritage Training Group has identified that of the £3.5 billion spent annually on building repair

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and the like, around £2.5 billion is spent on dwellings. Most of this is done by small builders and homeowners and so on. Many of these will be listed buildings or buildings within conservation areas and such people do not have access to the necessary information to do the work properly. The SPAB is actually very good in publicising ways of doing it properly but, even so, there is only so much they can do and there is a huge issue here where conservation officers tend to be at the frontline of trying to disseminate information on behalf of the local authorities and it is very difficult to get it out there. The vast majority of this work being done on the repair of general historic buildings is not properly supported.

Q126 Baroness Finlay of Llandaff: And if you are a home owner in a conservation area it is very difficult to access the information as well.

Mr Brocklebank: I would imagine it is extremely difficult, yes.

Q127 Baroness Finlay of Llandaff: Without having potentially to go through such frustrating hoops that the building will get more damaged whilst you are waiting for various tick boxes to go through?

Mr Brocklebank: I think there is that. There is also the case that home owners tend to rely on smaller builders who may or may not be aware of the correct way of dealing with historic materials. One can end up with a lot of well-meaning repair being done using incompatible materials. It is a very widespread problem.

Q128 Baroness Finlay of Llandaff: Do the others want to comment?

Mr Pritchett: I would love to, thank you. I think the important difference—and I would agree entirely with what Ian has had to say and I must also declare an interest that I am a committee member of the Building Limes Forum as well so it is very similar to my own views—is this is really a process of education rather than research here. The knowledge of the basic performance of building materials already exists. We are not talking about needing to carry out a lot of scientific research to gather that data—we have that data—it is just a question of getting it to the right people and it has to be through a process of education, and that is education to the hands-on craftsmen who are doing the work, the homeowners, the local authority people. I think most of the organisations represented here and most of the other organisations we have mentioned are making good progress towards that. Certainly in the 20 years I have been involved with it we have seen a lot of progress made. That does not mean we do not still have a long way to go.

Dr McWilliam: When I first read the evidence from the Building Limes Forum, I was sympathetic and I immediately checked up what had won prizes for conservation and found that last year the conservation structure that won the major prize from the British Construction Industry Association was the refurbishment of the government offices across the way in Great George Street. Well, you do not get more conspicuous and larger than that. That is not the end of the story however and squirreling away beneath all this my own panel within the Institution of Civil Engineers has been instrumental in setting up with the support of English Heritage as well as Network Rail and British Waterways and the County Surveyors' Society, the Historic Bridges and Infrastructure Award (HBIA), and it does not always fall on the larger, more dramatic rebuilding works. Looking at the prize list from a year ago I can see that the one that came out top was a place not many people have heard of, an old 1830s suspension bridge near Barnard Castle called Whorlton Suspension Bridge. The next one was Pontcysyllte Aqueduct, a much better known canal structure. The other three that came out top were the train shed at Waterloo Station, Hungerford Canal Bridge, a very modest structure by comparison, and the refurbishment of the cast-iron and masonry arch bridge at Myton on Swale in Yorkshire, which had community support, which brings in the previous question about community support. It was then taken over by the local authority, North Yorkshire County Council from the interested local groups. So it is not by any means totally blinded by large projects but there is that risk and certainly my initial impression was it could go that way. We are trying our best to ensure that modest iron bridges get some attention.

Q129 Lord Sutherland of Houndwood: I speak as someone who lives in a fairly old house and I am interested in the sort of criteria that should apply when repair becomes necessary and essential. Clearly there is one context where you are saying, "We are going to re-do all the sash windows because they are rotting," but you have time to think about that and so you can take the standards that are laid down by your various societies and by the listing agencies and so on and try and meet them. I can think of another example where suddenly a chimney stack becomes unstable and is dangerous. The perfect solution is to do a very military job and match everything but actually the essentials are to make sure that the thing ceases to be initially a danger and secondly remains serviceable. Clearly there is a clash of criteria here and I have faced it. I wondered whether there is anything that can be done professionally or through Historic Scotland in my case or through the listing agencies to enable me to respond to such an emergency with greatest speed. My one does not

matter very much and there are probably more important examples where danger means action and it is getting a builder that is the difficult thing not knowing what the regulations are.

Mr Brocklebank: It is slightly outside the immediate field but it does trigger off something which IHBC and SPAB worked on some years ago when we inaugurated National Heritage Maintenance Week. I am extremely sympathetic to the predicament of an unstable chimney, it must be pretty unpleasant. Our position is that people tend not to maintain buildings awfully well in this country and probably regular inspections will prevent such things happening.

Lord Sutherland of Houndwood: Look more often; fair point.

Q130 Chairman: Who is responsible for carrying out research on the impact of making historic buildings more energy efficient? Given the new ODPM building regulations we are going to have to look into that problem, are we not?

Mr Pritchett: I think that is an extremely relevant question. English Heritage are looking at a lot of that information at the moment and there are guides being produced by probably all of the institutions represented here. Some of those guides actually talk about how to upgrade buildings to make them more energy efficient. Others are possibly looking at how to get around the legislation, to avoid the buildings needing to be upgraded. One thing I think we need to understand straightaway is how buildings perform in the first place. Most modern buildings rely on being very, very well insulated and certainly a lot of lightweight modern buildings have high levels of insulation but they do not have a great deal of thermal mass, they do not have the ability to store heat within the buildings. A lot of historic buildings on the other hand have relatively poor levels of insulation but have a great deal of heat storage capacity within the building, and we do not fully understand how those two opposite ends of the spectrum perform. Something I am personally looking at in conjunction with some universities at the moment is thermal performance of existing buildings and new buildings because before we make rash decisions about how to upgrade existing buildings to make them more energy efficient, we need to understand exactly how energy efficient they are in the first place and where most of the energy is lost from them. Covering the walls with polystyrene may not be necessary if draft-proofing windows would do the job, for example, so there is an area where more research is required to identify how good a building is to begin with, where its weaknesses are, and how to address those weaknesses, rather than a knee-jerk reaction to alter buildings for the sake of it.

Mr Brocklebank: English Heritage are working on very comprehensive guidance to deal with some of these issues. It is a very substantial document. The Institute has commented on the first four sections of it, and there are perhaps another 30 sections with which to deal. It is a complex and large subject and it has a lot of implications. English Heritage put out interim guidance some years ago which was very interesting in that it actually points out that heavy curtains can be as effective as double glazing. It is useful to be able to have the background of that kind of research in qualitative ways and simply being able to point this out to householders and make it available to say you do not necessarily need to rip all your windows out and replace them with modern double glazing; a set of heavy curtains will do equally as well.

Q131 Baroness Hilton of Eggardon: A number of our witnesses have expressed concern about the decline in the people who work in this particular field and that it is an ageing population and not enough people are coming in at the bottom. Is this your impression from your particular field of expertise or not?

Mr Brocklebank: It has been for an awfully long time. I think the inauguration of the National Heritage Training Group is extremely encouraging because it provides a training route for craftsmen and so on within the building trades. Initiatives like that have a huge part to play and they are very valuable, but of course it will take time for them to make any substantial inroads really. At the moment people who choose to work in building conservation tend to do so for the love of it and there is not much in the way of promotion or further personal advancement.

Q132 Baroness Hilton of Eggardon: There is no career structure.

Mr Brocklebank: Not really. You do it because you love it, yes.

Mr Pritchett: I also have seen over the years periods of time when there have been great skills shortages. I believe the tide is turning, particularly in the National Heritage Training Group which has made a big impact on that. What worries me slightly more at the moment is that we can only maintain the higher levels of skilled people if there is a demand for them and we have a procurement structure for all building works, but certainly building conservation works are based on competitive tendering with very often the project going to the lowest possibly tenderer, and that seems to me to be counter-productive because on the one hand we are asking very highly skilled craftsmen to go in to do this work and on the other hand we are prepared to award the work to the cheapest possible firm who are going to do it and unless we actually recognise the quality of materials the quality of workmanship and those skills and are prepared to

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Dr Bob McWilliam, Mr Ian Pritchett and Mr Ian Brocklebank

pay for them, we may generate them but I think we will lose them again quite quickly.

Q133 *Baroness Hilton of Eggardon:* Is there a formal system of qualifications for individual craftsmen so that they have to be accredited perhaps to work on particular buildings or not?

Mr Pritchett: Those sorts of things are beginning to come forward at the moment. They are still in their very early stages at the moment.

Q134 *Baroness Platt of Writtle:* Do City & Guilds do it?

Mr Pritchett: Unfortunately, City & Guilds do not really exist in any proper form as far as I know these days. It has been replaced by the National Vocational Qualifications.

Q135 *Baroness Platt of Writtle:* NVQs.

Mr Pritchett: Such that I run a company repairing historic buildings and our craftsmen who have City & Guilds qualifications are no longer recognised as being competent whereas those with NVQs are. There is a current scheme called CSCS—the Construction Skills Certification Scheme—and those people who have missed out on getting a card by grandfather rights are now having to go through a

four-month assessment procedure despite the fact they have got City & Guilds and advance City & Guilds and 20 or 30 years' experience, whereas an 18 or 19-year-old boy from college with an NVQ2 would automatically get one, so unfortunately we have a temporary imbalance there.

Q136 *Chairman:* Am I not right that there is a new Sectors Skills Council being set up in this particular area of construction and creative industries or something?

Mr Pritchett: I am afraid I do not know the answer to that.

Q137 *Chairman:* It seems to me you ought to be talking to them.

Mr Pritchett: Yes, communication is definitely an important part of all of this.

Chairman: I think I must draw this session to a close but can I in doing so thank the three of you very much indeed for coming along. We are very grateful to you for giving your time. If there is anything that you would like to add to what you have said here today, please do write to us. Anything that you send in writing will be added to the transcript so it will be available and published for the general public, but thank you very much indeed for coming.

TUESDAY 28 MARCH 2006

Present	Chorley, L Finlay of Llandaff, B Hilton of Eggardon, B Paul, L	Platt of Writtle, B Redesdale, L Sharp of Guildford, B (Chairman)
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Memorandum by the University of East Anglia School of Environmental Sciences

The School of Environmental Sciences is regarded as one of the very best research and teaching institutions in the world for interdisciplinary environmental sciences and has achieved a 5** grade in the Research Assessment Exercise. It has maintained a successful group under the direction of Professor P. Brimblecombe, who has directed research on the cultural environment since the early 1990s.

CONSERVATION SCIENCE

— *How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?*

Although conservation science in the UK makes notable contributions to research the effort is dispersed and has no particular focus. The recent formation of the Institute of Conservation (ICON) may help, although its strengths are in supporting conservation rather than promoting research. The recent English Heritage strategy has been useful although largely relates to intent at the moment. Nevertheless, the clustering meeting “Preserving our past” Birmingham 29 March 2006, should help make things clearer.

In a few countries (ie Canada, Netherlands, Sweden) there are national centres for research in the conservation sciences, and although they do work of the highest quality they are often inward looking and focus on interests specific to the teams within the centres. This can lead to university and museum laboratories undertaking less research in these countries. There may be some decentralisation in Sweden and the Netherlands in future. The US has no national centre and is not especially strong in this research field. However, the Getty Conservation Institute is well founded and funds much research. It is very outward looking, although is focused on more practical aspects of conservation with a special concern for the developing world.

A number of other countries have explored short periods of national funding (eg Italy), but such bursts of funding seem of limited value. There is rarely a large enough group of scientists available to produce high quality coherent research during these short periods of high level funding to make such initiatives really successful.

Internationally the science has been hampered because it still attracts arts graduates rather than scientists¹. The subject area is often seen as more a branch of art and crafts, than of science. This means that it is characterised by a lack of critical refereed journals, poor citation frequencies, few clear scientific objectives or theoretical underpinnings.

— *Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?*

Funding for conservation research in the UK is limited and, more critically, fragmentary and discontinuous. It is largely derived from EU Framework Programmes or UK charities such as the Leverhulme Trust. Despite the fact that the UK is very successful in gaining EU funding, this is increasingly unattractive in a full economic cost environment. Furthermore recent EU Programmes, notably FP6, offered only very limited opportunity for funding heritage science. There is little Research Council funding. The Natural Environment Research Council under Science Based Archeology has a remit to support conservation, but strategically it has focused more on archaeology programmes. The Arts and Humanities Research Council is sympathetic to the needs of conservation, but has little experience in funding the level of scientific work required to promote conservation. The new initiative “Preserving our past” may redress some of these problems.

¹ although ECCO European Confederation of Conservator Organisations <http://www.ecco-eu.info/> would like to address this.

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The UK has some very skilled researchers, but few have been able to build sustainable careers in the area of conservation research. Without a sense of continuity in funding and a sense that the area deserves respect as a discipline it will remain difficult to keep a strong skill base.

— *How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?*

The research done in the UK is of the highest standard although dispersed. In both the European/international context it is viewed as highly successful and makes an innovative contribution.

There is a sense of incompatibility between the end users, who would like conservation science to be end-user driven and a desire among some of the top researchers to be generating concepts that lie at the cutting edge.

Increasingly heritage conservation is market driven, so the main management organisations (eg National Trust, English Heritage, Historic Royal Palaces) find collaboration increasingly difficult in terms of the effort that must be put into high quality research. Limited budgets within these organisations has meant that they have focused on their core objectives and increased public access, so they have a decreased ability to convert research output into changes in policy.

— *Is there a satisfactory process to develop practical applications of conservation research for the market?*

The market is small and de-centralised, although there have been a number interesting devices developed in the last few years. The University of East Anglia has patented a dust monitor as an outcome of its heritage research.

— *Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?*

Yes, but as a university we can encourage this in other organisations, although we will be involved in the heritage aspect of the 2006 BA Festival of Science.

USE OF INFORMATION TECHNOLOGY

— *In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?*

There are some excellent uses of eScience and virtual reality in the presentation of heritage. There has been some pioneering work on this within this university in terms of virtual walks through ancient cities and cathedrals.

— *Is there scope for improving the use that UK galleries, museums and others make of such technology?*

Although eScience and virtual reality offer great potential, IT is restricted in most heritage organisations to rather simple digitisation and storage of information, sometimes with a portal for public access.

Memorandum by Professor A.M. Pollard

I write as an individual who trained as a physicist and taught inorganic chemistry at university, but who has researched entirely within the sphere of the applications of science to problems in archaeology and conservation. My PhD, for example, was on the link between composition and degradation in Mediaeval window glass.

1. PROVISION AND ORGANISATION

1.1 I take “conservation science” as being the application of scientific methods to the study of the mechanisms and processes of the degradation of the archaeological and cultural heritage. The UK is widely regarded as a world leader in the applications of science to archaeology, but not, I suspect, in all areas of conservation science.

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1.2 In the UK conservation science is researched in a small handful of universities, notably UCL, Cardiff and Durham (and more sporadically in others). These are the prime foci for teaching archaeological conservation in the UK, and the research grows out of this. They tend to focus either on archaeological artefacts, or, in UCL, on building materials. Many of the larger museums carry out practical conservation of their collections (although a few national museums do not!), and some (notably the British Museum, the V&A, the National Gallery and the National Museum of Scotland) have scientific research departments. These are increasingly focusing on conservation science relevant to their museum collections, and away from the more archaeologically-focused work previously undertaken in some. As the lead body for the cultural heritage in England, English Heritage is the prime 'user' of conservation science in the form of its' buildings conservation section. It does support a large archaeological science capability (previously known as the Ancient Monuments Laboratory) which, as in the major museums, is being partially re-focused towards more conservation science research.

1.3 There is, however, much relevant research, particularly with respect to the conservation of large-scale sites and landscapes, which is carried out in departments such as Civil Engineering (eg, expertise in groundwater hydrology, effects of construction on buried features, etc). These are often excellent pieces of work, carried out in collaboration with professionals involved in the cultural heritage, in order to ensure relevance and integration with archaeological research strategies. In some cases, however, little attempt is made to integrate, or, more commonly, attempts are made but the right contacts are not established.

1.4 The co-ordination between these providers and users has, historically, been weak (beyond the inevitable occasional research partnerships between individuals for particular purposes). This is changing, with the welcome publication of English Heritage's research strategy, which will serve to focus such research, and the recent emergence of the Institute of Conservation as the professional body for conservators and conservation sciences.

2. ADEQUACY OF FUNDING

2.1 It seems to me that there are a number of lacunae in the funding provision for conservation science:

- (i) there is no particular research council which has responsibility for funding conservation science. Some input has been provided by EPSRC, particularly with respect to civil engineering considerations, and some from NERC where there is an interest in human-environment interactions. The newly-formed AHRC is taking the lead in funding studies of the cultural heritage, but whether this includes basic science is yet to be seen;
- (ii) English Heritage has espoused the policy of "preservation *in situ*" where development threatens the buried cultural heritage. This is based on a largely untested hypothesis—that the lack of explicit destruction equates with a strategy for preservation. For example, if a Mediaeval burial ground is "preserved" by being covered over rather than destroyed by excavation, can we be sure that the concomitant changes in environmental conditions (changes in hydrology, groundwater conditions, etc.) will not lead to destruction of the archaeological material *in situ*? An attempt to propose a thematic research programme to the Research Councils to study these issues in the late 1990's was unsuccessful, on the grounds that the scientific questions were not sufficiently well developed to be fundable by this mechanism. Whilst this is understandable, it is also disappointing, since of necessity many of the questions are of a general rather than specific nature (eg, what is the role of groundwater chemistry in the preservation or otherwise of a particular material?);
- (iii) There is a particular lack of funding for large-scale studies, such as are necessary for the preservation of large complex monuments in the landscape. These require large multidisciplinary teams, and can be difficult to fund through existing channels, given the well-known disadvantages of multidisciplinary proposals in conventional funding competitions.

2.2 Given the disparate nature of the relevant science-base, it might be argued that the limitation is not in fact the levels of funding available but the availability of suitable expertise within the system. Any proposed solution should aim to develop the human resource base as well as provide funds for specific programmes.

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3. INTERNATIONAL COMPARISONS

3.1 It is quite clear that other countries provide useful models for consideration. Canada, for example, has the Canadian Conservation Institute, state funded, which is widely regarded as internationally excellent in both conservation practice and related scientific research. The Getty Conservation Institute in Los Angeles, well-funded from private sources, also provides an excellent model. There is no UK equivalent to these. It would require large-scale and ongoing funding to establish such a centre—although desirable, I suspect this is unlikely. It is possible, however, that existing centres (selected universities, plus leading national museums and English Heritage) could, given some funding, be co-ordinated to provide a multi-centre National Conservation Institute.

3.2 Additionally, RCUK could be funded to promote a thematic cross-council research programme into some or all aspects of conservation science. This could also conceivably involve private sources of funding such as the Wellcome and Leverhulme Trusts, and be structured in such a way that it not only promotes scientific research into conservation science, but also builds an academic community and embeds it into the university system, as was done by the Wellcome Bioarchaeology initiative.

4. PRACTICAL APPLICATIONS OF CONSERVATION SCIENCE RESEARCH

4.1 I am unaware of any formal mechanisms for “commercialising” conservation science research. Work carried out in museum research departments (eg testing the suitability of materials for display and conservation, “problem solving” in particular cases, etc) will find immediate application, and may be published in the academic literature. English Heritage has a good track record of publishing and disseminating the practical outcomes of its own and commissioned research, especially in the area of buildings conservation.

4.2 If RCUK were to fund a cross-council research initiative into conservation of the cultural heritage, then the excellent procedures developed by the Research Councils could be used to commercialise some of the research funded.

5. PUBLIC ENGAGEMENT

5.1 I feel very strongly that archaeology and cultural resource management is a vastly under-exploited tool for getting the public engaged in science. I have taught archaeology as a science for more than 20 years, and feel that it is an excellent way of exposing students with a largely non-science background to the relevant sciences—they are introduced to a scientific application in archaeology (such as radiocarbon dating), and then have the background science (radioactivity, biogeochemical cycles, statistics, chemistry) explained in a natural and non-oppressive way. I see scientific archaeology as a “Trojan horse” for teaching science. The same is true of conservation science—not just for students, but of course for the general public. The fascination with the visible and non-visible cultural heritage is obvious, and needs little promotion. This interest could easily be used to foster a greater interest in and sympathy for science.

Memorandum by Professor Norman H. Tennent

PREAMBLE

This is a personal submission, intended to provide the Select Committee with information on some of the key issues which need to be considered in order to assess the current provision of science and technology for conservation of cultural heritage (hereafter referred to as conservation science) and the need for a national strategy for the future.

WHO AM I?

I am a chemist with 30 years experience as a conservation scientist, primarily working in the UK with a wide international perspective. I established a Conservation Science Section within Glasgow Museums in 1975 and remained as Section Head for 12 years. Since 1987 I have worked as a freelance conservation science consultant and researcher, based in Scotland. In 2001 I was appointed to the part-time Chair of Conservation Science at the University of Amsterdam.

I am one of a small number of full-time conservation scientists in the UK and one of a handful of freelancers worldwide. My Chair has no equivalent in the UK.

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Working as a generalist, I have nonetheless developed specialties including the conservation of decorative arts (notably ceramics and glass), stone and buildings, colour measurement, adhesive formulation and testing, and preventive conservation.

CONSERVATION SCIENCE IN THE UK

- The UK provision of science for conservation is commensurate with that of other countries in the EC and N. America.
- This provision (approximately 20 conservation appointments in museums, galleries and universities) is highly inadequate for dealing with the conservation and preservation of the nation's cultural heritage (comparisons with medical research make this point forcefully).
- There is no national strategy for conservation science in the UK nor is there any co-ordination of the present provision.
- There has never been any thorough quantification of the UK conservation science effort in terms of researchers, teachers, topics of investigation, responsibilities, funding etc.
- UK conservation scientists are primarily found in the principal National Museums and Galleries. University-based researchers do engage in conservation science but there are very few university posts specifically for conservation science.
- There is very little conservation science support for the non-national museums in the UK. Within Glasgow City Museums, an important laboratory with two scientists was active in the 1970s and 1980s. It no longer exists, as a result of local authority cutbacks.
- There is no mechanism and little opportunity for non-national museums or bodies such as the National Trust and the National Trust for Scotland to benefit from conservation science expertise elsewhere in the UK.
- Private conservators have little opportunity to work with conservation scientists, a situation which is mutually disadvantageous.
- There is a preponderance of research into paintings. Some important subjects (eg stone and buildings) receive scant attention in relation to their national importance and the severity of the problems.
- Most of the science devoted to cultural heritage does not directly tackle conservation problems (this science, normally referred to as "technical art history" and "archaeometry", needs to be differentiated from true conservation science).
- Very little conservation science takes advantage of the opportunities for interaction with industry, notably the chemical industry. There is great scope for mutual benefit.
- Much conservation science is involved with only the "research" component of R&D. There is little follow-through to "development" and therefore diminished impact of research investment.
- Research funding from the UK Research Councils and other UK sources is difficult to access. The types of project which best benefit conservation are not those which are likely to attract funding from science funding bodies because the science is not viewed as sufficiently cutting edge. On the other hand, arts and humanities funding bodies view conservation science as too scientific. A source of funding dedicated to conservation science would overcome this.
- Effective conservation science funding need not only involve large sums. A source of small grants would be equally stimulating for problem solving in conservation science.
- The UK should look to exemplars elsewhere. The national research institutes for conservation in the Netherlands and elsewhere are worthy models. The enormous impact of the Mellon Foundation grants in the USA needs to be evaluated in the UK.
- A small increase in the number of conservation scientists in the UK would have a major benefit. Each of the UK conservation science departments is below an effective critical mass.
- Conservation science is becoming increasingly swayed by prevailing fashions such as "access". Many crucial questions of treatment and preservation of cultural heritage are not glamorous and, as a result, parts of our cultural heritage are suffering, sometimes to the extent of complete destruction, through lack of technical knowledge.

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- Conservation science can be a potent subject for improving the public understanding of science. It is also a potentially persuasive tool to help revive the interest in science as a subject of university study and thereby combat the decline and closure of university science departments, notably chemistry. However, the input of conservation science to science undergraduate course in the UK is virtually non-existent.
- Conservation science is one of the few branches of science with the potential for immense socio-economic benefit where Parliament can bring about a major impact for relatively modest expenditure.
- Definition of the scope, current provision and funding, future priorities and extra resources are all necessary for progress in the field of conservation science in the UK.

10 February 2006

Examination of Witnesses

Witnesses: PROFESSOR PETER BRIMBLECOMBE, University of East Anglia, DR ERIC MAY, University of Portsmouth, PROFESSOR MARK POLLARD, Oxford University and PROFESSOR NORMAN H TENNENT, University of Amsterdam, examined.

Q138 Chairman: Good morning, may I welcome you and welcome also members of the general public who are here. Over there on the bench are some papers which explain where members of the Committee have interests which may be relevant to this inquiry and also a little bit about the inquiry. I should like very much to welcome our witnesses today. I wonder whether you would like to start by introducing yourselves and then after that perhaps I could ask each of you to give a brief outline of your current research. Could you just start by introducing yourselves very briefly?

Professor Brimblecombe: Peter Brimblecombe, University of East Anglia, School of Environmental Sciences.

Professor Pollard: Mark Pollard. I am the Edward Hall Professor of Archaeological Science at the University of Oxford.

Dr May: Eric May. I am the Reader in Microbiology at the School of Biological Sciences at the University of Portsmouth.

Professor Tennent: Norman Tennent. I am Professor of Conservation Chemistry at the University of Amsterdam, but I am also a Scottish-based freelance conservation consultant.

Q139 Chairman: May I ask each of you perhaps to give a brief outline of your current research and its bearing on the fields of cultural heritage and conservation science?

Professor Brimblecombe: My work is largely in the atmospheric sciences. I am a chemist by training and I have been very interested in air pollution problems as they relate both to the damage of the indoor and the outdoor heritage. More recently I have been much more interested in how that scientific research converts into policy and I have been interested not only in the policy interface, but the interface of the physical and chemical changes with aesthetics. I

really do think that this opens a whole range of things where scientists can interact in terms of influencing policy here.

Professor Pollard: I am originally a physicist and then a chemist, but my research over the years has been in the areas of chemistry applied to archaeology in general. The areas most relevant to here are an interest in the corrosion mechanisms of archaeological metalwork and an interest in general in the interaction between environmental conditions and the degradation of archaeological and cultural materials. My PhD was actually on the corrosion of mediaeval window glass, so I started quite early. I have also been the national co-ordinator for science-based archaeology, which is a position which was mentioned in one of your submissions as a model to think about. Finally, I was a co-principal applicant on the Textile Conservation Centre which is now at Winchester, which is also mentioned as a model in one of your submissions.

Dr May: My interest is as a microbiologist. I am interested in the effect that microbes have on building stone; that is my specialisation for something like 20 years. It started out looking at damage with the Building Research Establishment in Garston. That lasted about 15 years, but in the last five years I have been interested in the positive aspects in relation to micro-organisms on buildings and using them to change the character of crusts on buildings. Pollution crusts are a problem and I have been co-ordinator for a European project which has been looking at bacteria as a means of removing sulphate crusts from buildings and then using other bacteria to consolidate the stone. This is, if you like, the positive biotechnological use of microbes. I have to say that in order to do that you need to know a little bit about the damage that they do. I have also acted as an evaluator for European Union projects in recent years and obviously seen the problems that we have

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and Professor Norman H Tennent

in terms of funding. It is certainly the case that there is a vacuum and my interest in this meeting is to try to look at that with you.

Professor Tennent: My training is also as a chemist and it is true that chemists are generally at the heart of this profession of conservation science. For 30 years I have been very much involved in research which is problem-driven, so my current research interests tend to be, in many cases, strands which have continued throughout these years in a general sense, for example the testing of materials for durability for application to the conservation of cultural heritage in order to ensure long-term satisfactory results for any applied method. Topics of continuing interest in that realm are the use of adhesives, particularly for decorative arts, glass, ceramics. I am rather interested in the effects of indoor pollution on the deterioration of artefacts and if there is anything that sums up my current and continuing research strategy, it is the art of the possible: where my expertise as a chemist and as a conservation scientist overlaps with the needs of the conservation profession and is made possible by funding facilities and other practical issues.

Q140 Chairman: May I put a general question to all four of you on this which is that one of the issues, which has already percolated through from the written material we have received and from the evidence that we have had so far, is the worry about the age structure of your profession and the need, in a sense, to grow a new continuing generation, people to succeed you. Could you tell us a little bit about doctoral and post-doctoral research in your area and how far you feel there is enough research funding coming through to provide the necessary places for such post-doctoral research?

Professor Pollard: I am happy to start on that. My experience is that it is rather ad hoc. It sort of depends on whether the right student and the right project come along at the right time and can be put together. Sometimes good students with good projects do not get funding and possibly vice-versa may also be true sometimes. In my experience it is very difficult to have a strategic viewpoint, to say that we need to know more about these sorts of areas and to target students and funding at those areas because it is a rather haphazard process.

Professor Brimblecombe: May I really agree with the problem that you have quite clearly identified in that it is absolutely true that the age structure is very much a problem and attracting PhD students and indeed funding them is a problem? If you just look at the career structure of the four witnesses, they all primarily did their PhDs not in conservation science but in straight science. It is just not the lack of

funding, but it is where that training is going to take place that is still problematical.

Chairman: Indeed, yes, with Essex having closed its chemistry department and Sussex intending to close its down.

Q141 Lord Chorley: Would you say that it is actually better to get your real PhD training in a hard science before you are let loose on the world of heritage, putting it in rather extreme terms?

Professor Brimblecombe: I would almost say that. The reason I would is that so often I see failings where I look more broadly at European PhD programmes, where they often are primarily driven from an art historical perspective, even though they are trying to be conservation science. There are dangers in that particular approach. There also really has to be a strong scientific approach.

Dr May: Actually PhD study is very much about students who have a strong interest in a particular aspect: they are enthusiastic about their PhD; they do not really see it as a means to entering the profession. The other point I should make from my point of view is that PhD studies are relatively cheap in terms of sustaining research, and in this sort of field, where there is not a stream of funding for post-doctoral and general grants for research, PhD bursaries are actually quite a useful way of keeping yourself active in the field. Certainly over the last 10 years I have been able to keep myself active during periods of drought in terms of funding. The other point I should make, which I did not really emphasise when I was talking about my background, is that I come from the applied science area in terms of research and it is the case that it is impossible to actually sustain heritage research on its own. In fact my other line of research is wastewater research and I work closely with civil engineers. I have this two-pronged attack in order to sustain my interest in research. Heritage is alongside that and certainly, in order to keep myself research-active, it is necessary to have this two-pronged approach. There is a lack of funding and PhD funding bursaries are a useful way to keep going during the periods of lack of funds.

Q142 Chairman: Do you generally perceive a lack of funding in this area?

Professor Tennent: May I say yes, but elaborate a little bit before I expand upon that aspect of what my esteemed colleagues have been saying. The potential for expanding PhD students and PhD research and the like very much depends on having the core framework within the university system and within the conservation profession and there, to my mind, lies the difficulty in allowing this efflorescence of many new research students and research projects, because as far as I am aware my chair as a

conservation chemist in the University of Amsterdam has no equivalent in the United Kingdom. My colleagues are very involved in conservation research, but I suspect they would agree that they are not strictly conservation scientists: they are scientists who are expert in particular subjects and apply that to conservation. That is exactly what the field needs: the expertise that is rich in the country being pulled into the field. However, it is the core of the profession that is absent and not sufficient for that task, so I do believe the two are connected.

Q143 Baroness Platt of Writtle: You have talked about shortage of money for research, but what about the applicants? Are there plenty of good applicants and if there are not, is there anybody encouraging applicants to think eventually in terms of conservation science, even if, as you have said, to begin with they are in hard science? Obviously you need hard science if you are going to be good at conservation science.

Professor Tennent: The answer to that splendid question is yes, there are good applicants out there and certainly yes, this is a very attractive field for young scientists and, may I say, for somewhat older scientists. So the possibility of enrolling good quality, enthusiastic, young scientists is high. The bottom line is the framework for so doing and there are perhaps, it may be argued rather strongly, not sufficient opportunities for bringing those in and again we come back to funding and the access to funding for conservation science projects. Without getting ahead of myself, the conservation science funding is very much facing up to the onslaught of other branches of funding and in a direct comparison too often conservation science is seen to be not cutting edge enough. It can be very cutting edge, but it certainly also has to be very applied to be useful and therein lies the difficulty.

Professor Pollard: We would be very unusual, if we were to sit here saying there was enough money for what we wish to do. No, there is not enough money. Perhaps a more pressing problem is the structure and there is no funding framework. If a good student comes to you and says they would like to work on the technology and chemistry of pigments in mediaeval wall paintings, there is no obvious and guaranteed source that you can go to; that is not to say that you want guaranteed money, but you want to know. There is an issue of continuity of funding. As I said in my opening remarks, it is very *ad hoc* and it depends. One of the things I should like to bring to your attention as a model is the funding mechanism that the Wellcome Trust used a few years ago in a slightly different area, an area called biomolecular archaeology, where they had a structured competitive programme, first of all for PhD students

and then for a lesser number of post-doctoral positions and then for a lesser number of established positions which the universities then had to agree to take onto the books. That structure was partly aimed to promote the science in the area, but it was also specifically aimed to establish young people in the academic profession. Going back to an earlier question, if you want to ensure some follow-on in a younger generation, then a model like that is a very effective way of doing it.

Q144 Chairman: May I just add to that one? In your area the Leverhulme Trust is one of the private funders of research and the Wellcome Trust, when it did this in the medical area, acted very much as a catalyst to get the research councils moving in these various areas. I wondered how far you felt that a similar initiative, perhaps through one or two of the private funders including perhaps the Leverhulme Trust, might be able similarly to act as a catalyst to get RCUK co-ordinating a programme here.

Professor Pollard: My view is a rather cynical and basic one and that is, if you wish to promote something in the UK university system, you need to inject funding and able people will follow the funding and it will promote that activity and it will snowball. You then have to worry about the continuation and how you sustain it; sustainability is a big issue. Certainly it is the only way in promotion of activity.

Professor Brimblecombe: The problem is with something like the Leverhulme Trust that in a university environment it does not attract the kind of professional respect that getting a research council grant really attracts. In a full economic cost mode, these do not look as attractive anymore as research council funding. If we really want to promote this seriously, ultimately it has to come from research councils.

Q145 Lord Paul: One of the criticisms I hear about research is the lack of co-ordination between the various research centres; they do not co-ordinate enough, so a lot of research happens which is just almost reinventing the wheel. Secondly, the importance of time, that somehow there is plenty of time to do the research and not finishing and time-bound research which boils down to lack of productivity. What would be your answer to that criticism?

Professor Pollard: The first part is a natural consequence of a small, and if I may use a biological analogy, filter-feeder community which is taking what resource it can as it goes past. It is very difficult to have long-term plans on that basis and therefore it is very difficult to enter into co-ordinated partnerships to say "Yes, we shall do this and you do that and we shall build on the other". Naturally from

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the university sector I would reject completely your allegation, but I have heard similar. There are issues of encouraging completion and urgency, but that is not simply a matter within conservation science, that is quite a broad issue and the the research councils are putting sufficient pressure on universities to reduce that problem.

Q146 Lord Paul: Does Professor Tennent have anything to say on this?

Professor Tennent: I must absolutely say that one of the problems that I perceive in this field is indeed the lack of strategic co-ordination in so far as what I described as my own philosophy of the art of the possible does probably hold true for the field in general. This means that conservation research springs up where enthusiastic people are active and determined and thereby successful in promoting certain areas of research. At present, there is no national co-ordination of this. There is no way, it seems to me, of seeing whether there is too much research on one topic and absolutely not enough research on other topics. As long as it is left to the individual of course this is marvellous and that is the way universities survive. Nonetheless, alongside of that, the national need for cultural heritage is not being taken care of in a strategic way. If it is helpful to give examples, I need to go to the City of Glasgow. There is no research whatsoever on building stones and their conservation for perhaps Britain's greatest Victorian city; no scientific research at all.

Dr May: I should also like to say something in response to the co-ordination aspect. Tomorrow we are having a meeting in Birmingham which is a start, *Preserving the Past*, and it is actually going to be a very good opportunity to address that problem. I should like also to make the point about the education side; we need to create the sort of attitude to education in the profession which exists in other parts of research. I work in wastewater and one of the most successful aspects I have been involved in has been the Teaching Company Schemes and the Knowledge Transfer Partnerships. We have run these very successfully and currently we are running one which is to do with wastewater. There is an opportunity here for us to develop this for museums so that knowledge partnerships can actually get the interaction between the museums and the universities which is going to provide a good environment for the education of young scientists. I have been impressed with the way that the knowledge transfer partnership provides an educational framework for PhD students. Certainly in my case it has been very helpful to employ that model in studentships that might be running for other fields of research. Thus there are models within existing research areas which could bring together the Research Councils and museums;

certainly the idea of analogue status, which is being used by the Arts and Humanities Research Council, should be extended and opened up to knowledge-transfer partnerships with universities.

Q147 Lord Redesdale: From what you are saying, it seems to be that most of the basis and all the work in science is just done by a collection of the willing who have an interest in the heritage sector and therefore the work gets done, but there is no other reason the work would get done in this country.

Professor Brimblecombe: That is true. What that does is give the kind of illusion that Lord Paul made that sometimes it seems that output is not emerging and that is a real danger, or rather it probably submerges: it occurs but it is not seen. Because there is no structure to this, it is almost not recognised as a science and when you have science as recognised, they develop journals, for example, highly respected referee journals which have not really developed in this field. It is an important omission which does lead to a loss of information even when it is there and well researched.

Q148 Lord Redesdale: The heritage area is going to be funded by the Arts and Humanities Research Council. Would you then say you were an art rather than a science?

Professor Brimblecombe: I should not. I really believe it is a science and my concern with the Arts and Humanities Research Council is that their interest, while it might be very much in heritage science, at heart may not primarily be in the development of science and the way that moves forward in aid of conservation.

Q149 Lord Paul: What would you like to see emerge from the current negotiations on the European Communities Seventh Framework programme? What would be the consequences of failure to secure adequate funding for conservation science? To what extent have you drawn on previous framework programmes in developing your research?

Dr May: May I come in here, as someone who has just finished a European Fifth Framework Project. We were very greatly disappointed when the Sixth Framework was published and there was a serious drop in the direct funding for heritage research. One of the other issues is where to find the funding. It is really difficult to negotiate your way through European websites to find the best sources of money necessary when you have a situation where you do not have an actual budget line within the framework. There seriously needs to be pressure for the Seventh Framework, possibly from English Heritage. I understood, certainly at a recent meeting with MEPs in Brussels, that they are trying to get agreement

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within a European research framework involving heritage organisations in Europe in order to put some sort of funding for research into the Seventh Framework. This is a very good initiative but the important thing is that we should have a parallel track. It is necessary for us to get our act together within the UK in terms of research, but also to ensure that the funding stream from Europe is actually sustained and this could be done by heritage organisations getting together.

Q150 Lord Chorley: It is nice to hear that English Heritage is taking the lead. Two thoughts occur to me. Is it not really a DCMS responsibility? English Heritage is built heritage, but what about all the collections, that aspect of conservation?

Dr May: If the Department can take on that responsibility, then obviously that is a good thing. We are looking at it from the bottom up. It is not quite the bottom up, but if you have a desire within Europe for the heritage organisations to organise research within a framework, then that may also help; but yes, certainly the Government.

Q151 Lord Chorley: I suppose there is no European organisation.

Dr May: Not the equivalent of English Heritage in Europe. As I understand it, English Heritage has been pressing to get people together to talk about a research strategy for Europe which seems to me to be a good thing.

Q152 Lord Chorley: Perhaps we had better wait until they come to give evidence to us.

Professor Tennent: It strikes me, as one who has successfully bid for European funds, alas in the past, that the tragedy was when Europe and the European Commission lost their dedicated fund for cultural heritage. Thereafter conservation research had to take its chances against many and differing topics. This indeed is what one would hope for the future, that cultural heritage would be specified in Europe as an area of ring-fenced specific funding. It would be lovely, very welcome, if it were also perceived in the United Kingdom as a topic of specific ring-fenced funding. Talking about Europe, which was the question, therein there will be the possibility then, were that to be case, of successfully bidding. It is interesting too that the European Commission does seem to be specifying areas of need, preferred areas of research application, and that again is an interesting feature which could perhaps be a welcome one, not just in Europe but in the United Kingdom as well. Were we not to have a source of European funding, then the situation will be increasingly dismal without viable alternative sources to replace that excellent and enormous fund.

Professor Pollard: Obviously any source of funding is welcome, but may I sound a slightly curmudgeonly note on this? My own institution does not encourage me to apply for European funding because it is deemed to be too bureaucratic and too time consuming to apply for and the levels of overhead that come with it are deemed to be not sufficient to pay for the full economic cost of the project. Although European funding would be very welcome, could I just hark back to Professor Brimblecombe's comment about the respectability of funding. To get the UK scientific community really active in this area, the initiative and the funding need to be channelled through the research councils in the UK. That is the gold standard of respectability for the sort of scientific areas that we operate in.

Q153 Chairman: I take it that, with the research councils moving over to full-cost funding for their own research projects, it poses even greater problems in relation to taking on the European funding.

Professor Pollard: Absolutely.

Professor Brimblecombe: May I just continue, because the question in a sense had several prongs to it. The first prong was what we need in the Seventh Framework and that was very clearly recognition of cultural heritage. Despite all the problems with full economic costs that we would encounter, we do need to be engaged with Europe. If that does not happen, which seems to be the second part of that question, what will happen is that we shall see more fragmentation of heritage science within Europe which has built up quite successfully, and notably better than that in the United States and Canada, over the last two decades, and we shall lose what we have gained from the collaborations.

Professor Tennent: For funding applications, what do the university staff do? They are recognised in their work, they apply for grants for research; that is part and parcel of the university research. What do museum workers do? They do not actually have the latitude in the same way to build in a month of work applying for a research grant from Europe. It is not in the framework of museum scientists who are at the coal face solving problems day in day out. Therefore for funding strategies such as we are talking about, the opportunities for accessing funds, even if they are there, are not balanced equally between the universities and the partnerships with the museum and organisations such as English Heritage.

Q154 Lord Chorley: You touched earlier on privately funded research when you told us about the Wellcome Trust, which was very interesting. I had not heard of the Wellcome Trust being involved before. What is the significance of privately funded research? We have heard about Leverhulme and we

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have heard about the Mellon Foundation; Leverhulme is British, Mellon of course is American. What is the significance of privately funded research?
Professor Pollard: I am wondering whether you are asking about the significance in general or the significance in this specific area.

Q155 Lord Chorley: In general in the field of heritage conservation.

Professor Pollard: The advantage of privately funded research is that it is less tied to strategic planning from the research councils. Much of what we do is very inter-disciplinary: microbiology, chemistry, aesthetics.

Q156 Lord Chorley: You can fill in the holes.

Professor Pollard: Yes. So in many cases the private charitable foundations are the only source you can actually easily go to with such a strange combination of backgrounds to do the piece of research.

Q157 Lord Chorley: But do we have any idea how significant the private sector is in the total picture of funding of heritage science?

Professor Pollard: My guess would be, but I stand to be corrected, that it has only been a minor player. I do not know of any large Leverhulme—

Professor Tennent: I suspect the problem is that the whole profession is continually guessing at that kind of answer. There is very little quantification on a national basis of what is happening. So to put figures, put weight on these questions is very difficult indeed and, of course, it is not just private funding bodies such as Leverhulme or Mellon in the United States, because there is also access through other governmental sources. To be specific—it may be helpful—I myself am currently engaged in conservation research through my own private business funded by Scottish Enterprise. An obscure approach perhaps, but an imaginative approach is perhaps what one needs here. In so saying, sometimes I do fervently believe the kind of research that this field needs is not necessarily the research that will produce a PhD student. It could be much more small scale, a specific problem which needs modest funding relatively, that needs funding that would not come from the research councils because it would be too modest from their point of view. That is where other sources can well play a role. The British Academy has funds, very small, of that sort but they are vitally important. The range of funding is enormously important, but we do not have a quantification of it at present.

Q158 Lord Paul: With the increase in private people making collections, et cetera, is there any funding coming for commercial reasons into the universities?

Professor Tennent: The problem about conservation research is that there is very little, as I see it, commercial benefit for much of the research. We are not in drug research, fortunately not—I have just listened to the radio to hear that it costs £800 million to take one drug from research to the market—we are not in a field where commercial realisation is so obvious or easy. It is possible, but it requires imagination and hard work. For that reason, commercial support, and it is minimal as far as I perceive it, has to be more in the sense of sponsorship.
Dr May: My European project was actually about producing a technology which could be used to treat buildings. In that sense it has a biotechnological application which could be commercialised. At the end of it, we got to a point where we did not quite finish the research to get to a technology which could be immediately translated to the market. I have not had, across the whole consortium, large numbers of industrial partners wanting to do the research. It just does not exist. I can say that colleagues at the Mary Rose Trust do get some support for what they are doing there in relation to polymers and wood conservation, but in general industrial support is rather small in terms of the heritage area because the market is not great. That is the issue.

Q159 Lord Paul: Is there a scope for further development in that? I know that at the moment it is very small, but the universities are now going to industry in Britain, so is there a possibility in this field?

Professor Tennent: If one looks to other countries, cultural heritage is supported commercially. In Italy, for example, every major project has a bank or some corporation behind it. That has not been the British trend for reasons that I can guess at, but I am sure that there would be scope.

Professor Pollard: If you are a chemist and you want to raise funding for a particular project, then you know the industry; it is a large industry and you know where to go. For the cultural heritage, the industry as such tends to be small and medium enterprises. It is the hotel-keeper in York or it is something like that. There is no central, large, well-funded industry that you can go to and say you want to make a development which is of benefit to the cultural heritage.

Q160 Lord Redesdale: This is only a one-word answer from each of you actually. Which organisation would you actually like to see lead this? Would it be DCMS, DTI or English Heritage or another body? Which organisation should act as leader in the field?

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Professor Pollard: From my perspective it would be English Heritage, but that does not account then for the moveable heritage.

Dr May: From my perspective, also English Heritage, but we have a UK dimension here so there are other partners within the UK, Historic Scotland, et cetera, which is not included here, but certainly English Heritage.

Q161 Lord Chorley: The difficulty is that English Heritage is rather more active and imaginative and pushy.

Professor Pollard: It is bigger. It is by far the largest of the equivalent organisations.

Dr May: I have to say that Historic Scotland has quite a good output in terms of guidelines, research certainly goes on and they are quite innovative in that respect.

Q162 Lord Redesdale: Do you see DCMS having a role at all?

Professor Tennent: Absolutely. The problem is in Britain that there is this split between moveable and immovable cultural heritage and the organisations that enable that are not the same. So the one-word answer is hardly possible because of the fact that different organisations have their own responsibilities and therefore that some mélange of DCMS, English Heritage and Historic Scotland, I do not know what, which ensures cohesive, comprehensive overview and enabling of funding, would be the ideal. How one achieves it . . . ?

Q163 Chairman: Would you welcome a centre? In Holland there is a research centre which pulls together research in this area and in Canada you have the Canadian Conservation Institute. Would you welcome something of that ilk?

Dr May: May I just say that I feel that that may suck money into the centre which would probably lead to a loss of diversity. The irony is that at the moment we have a really diverse range of activities throughout the UK. What we want to avoid really is putting all of the money into one particular centre where it would then be more difficult for the diversity to be maintained.

Q164 Lord Chorley: Do you mean play the system as it is.

Dr May: I have to say that we are very good at doing that.

Q165 Lord Chorley: You have to do that to stay alive.

Professor Brimblecombe: The danger of these centres, and they are often very, very good and do exceedingly good work, is that they end up being rather inward

looking and some of the more exciting ideas which we see in UK conservation science, which is recognised really in Europe and the world as being very, very diverse, strong and innovative, get lost. It is not only loss of funds, it is the fact that these centres begin to dominate the way in which the science develops and no matter how good they are they do not always succeed. If you were to turn to look say at a similar inter-disciplinary science like environmental science, it did not develop its strength in Britain by having a centre; it developed because it has a large number of very powerful groups.

Professor Tennent: It is a vital question and not an easy one to answer and I do know the British and the Dutch scenes both equally well; in neither case perfectly. The advantage of the Dutch system is essentially that they have a national conservation centre for a moveable cultural heritage and a different organisation for the built cultural heritage; in Belgium there is a national institute for both, so there are many versions of this. What it does achieve by having a national institute is that it provides that critical mass of scientists working together in one place with the resource and the flexibility that that can have. That means that in the Netherlands, in the Conservation Institute, there are scientists who are daily problem solving for their constituents, the museums, who come with problems and get an answer after some experimentation. Equally well, because there is that critical mass, the scientists are able to engage in the more fundamental research which is also vital and is the platform on which that day-to-day problem solving has to be built. So both are necessary. In Britain, it strikes me that that dichotomy tends to be that the universities tend to do the fundamental research on the whole and the museums stimulate that and do the day-to-day problem solving on the whole. That is an extreme presentation, but it means it is happening in two different places. To have it in one place brings about that opportunity that a critical mass in the Netherlands of 20 scientists working together has. It also brings about the ability, on a five-year plan, to prioritise needs. In the Netherlands the needs of certain aspects of the cultural heritage are the priority for this coming five years. To my regret my own field of ceramics and glass is not one of their priorities. So be it. It is made on the grounds of a rational look at the overall view. It strikes me that does not happen in Britain. Of course there are centres of excellence and they are enormously excellent centres of excellence, but the strategic view of a national institute is missing. There is also of course the concept of a virtual national institute which Britain might consider.

Professor Pollard: I am very much in favour, on balance, of a centre. There are dangers in it sucking in all the money and not allowing the diversity and

there are dangers in it becoming rather self-focused. On balance, for all of the reasons that Professor Tennent has pointed out, it is a good thing, it is a national focus, it gives profile and it give credibility. This is a word we have used several times. Many of us feel that there is an issue of our own scientific credibility, if we wish to work in this area, because other chemists look at you and think it is a bit of fun but it is not real science. Of course nothing could be further from the truth. I am on balance in favour, but I was very much in favour of the AHRC research centre scheme which was set up a few years ago and which I understand is not going to be renewed. For example, the textile centre at the University of Southampton has been very successful and if you guarantee somewhere funding for five or eight years and then say you are going to renew and that renewal may pull the money out, it does focus your mind; if you say “If you don’t cut the mustard over this time, we’ll shift our funding to another centre”. There are ways of keeping it viable and active and it could well be based on one of the national museums. That would also be quite an innovative way of doing it.

Q166 Baroness Hilton of Eggardon: There are various communities looking at research in this particular field; there are all you, there are the universities, there are museums, there is English Heritage. I wonder to what extent you actually manage to be complementary or to co-ordinate what you are doing or is it totally ad hoc and all over the place? We keep being told that there is no overall strategy, but do you at your level actually co-ordinate what you are doing. Is your work complementary?

Professor Brimblecombe: I think we do on an individual basis. I work a great deal with Historic Royal Palaces, National Trust and English Heritage. It seems to me that, as you have heard a number of times, it is quite different. The university research that I should like to do is about hypotheses, broad, generalisable things relating to heritage, whereas very often what the heritage organisations want is a solution to a project or the utilisation of science with respect to a single object. So there is a slight difference and there is often a tension there, although I enjoy that tension in a sense because it does bring focus to the work. Because we lack a strategy, those collaborations and those interactions remain ad hoc, as much in this field does.

Dr May: Our group and people associated with the work we do on historical buildings have relationships with English Heritage, but this is in an advisory, supporting capacity; no funds are made available. For my particular area of microbiology, it is probably the least understood area but things are beginning to happen in the sense that there is now an appreciation that microbes do exist and may cause

difficulties so there may be prospects for the future. As far as formal links are concerned, my particular research areas have had to rely heavily on European funding as well as Building Research Establishment funding.

Professor Tennent: The ideal is when the problem comes from the community and the universities are involved. The issue is that Professor Brimblecombe is well known in the museum field for his interests in environmental problems which are of relevance to that. How many university scientists with expertise for the field of conservation exist, but are not known by the museum community. Therein lies one of the problems. This bringing together of the two fields requires time, energy, knowledge, all that sort of thing, which requires a strong core group of the conservation science professionals to locate the relevant experts. I am working with the department of colour chemistry in the University of Leeds. Colour chemistry is vital to the cultural heritage. As far as I am aware, no-one else in the conservation community is working with that university. They are doing research of vital importance, but they do not know about the conservation problems and the conservation community is not well enough versed in their expertise. Therein lies one of the problems.

Professor Pollard: There is co-ordination, but it is rather ad hoc. It depends on individual-to-individual contact. I work with the Ashmolean Museum for instance and also the Bodleian Library—we must not forget the paper conservation issues here. Again, I have a rather cynical view that if you want to co-ordinate the activity of academics you have to put money in because that is the only way to co-ordinate academics.

Q167 Baroness Finlay of Llandaff: Talking about money, do you have undergraduate scholarships for elective projects on different aspects of conservation, to get projects done at relatively low cost between academia and the non-academic sector?

Professor Tennent: May I pick up on one possible route and that is that in the university sector there is one very valuable source of research and that is research done by students on the conservation programmes. They are not training to be conservation scientists; they are training to be conservators/restorers. In such projects often, almost the rule, there is a conservation science related project where there are pairs of hands ready and willing in each of these courses to undertake that research. There is a pool.

Q168 Baroness Finlay of Llandaff: That sounds a bit like a silo: you have one group of people. What I was thinking was people doing chemistry degrees or physics degrees, basic science degrees, who have as an

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elective project to incentivise them, the ability to get a scholarship so for one of their projects they get some additional funding, but it takes them into conservation science and whets the appetite of the undergraduates as well as getting some of the research done.

Professor Pollard: I do not know of any such scholarships. We do not have undergraduates specifically, but we do occasionally have undergraduates in chemistry who wish to do something applied to archaeology or conservation and that fits your model. They are not in general—and this is no criticism of their parent department—encouraged to do that because in general it is not seen as a terribly good career move for somebody who is training to be a chemist or an earth scientist. If there were some incentive, that might well be appropriate; possibly more useful at the master's level where we do have students who occasionally work in conservation science related areas. I agree with Professor Tennent that the biggest resource in this area is the teaching of conservation in UK universities which, as your evidence has shown, is sadly declining. That is a general issue which needs looking at.

Q169 Chairman: It also picks up the point which Dr May was making about the use of CASE studentships and the possible application of CASE studentships in this area.

Professor Brimblecombe: May I interrupt and throw in a note of caution here. It is true that undergraduate students and master students whom we utilise in this way represent a resource, but it should not be allowed to make it seem as a kind of amateur thing that you do on the side, because in the end these things very rarely lead to output in terms of hard things like publication. We have already heard that there is a perception in this field that nothing ever happens, that there is a dusty undergraduate thesis which is lost. We see it as a resource and it is very useful for stimulating initial little projects, but in a sense it is not the end at all.

Q170 Baroness Finlay of Llandaff: It stimulates interest.

Professor Tennent: I rather disagree with my esteemed colleague in so far as quite the reverse: I see an undergraduate project very often and it is my experience in the chemistry department of Glasgow University, where I had a fellowship for several years, that the undergraduate project then translated, having evaluated the problem, having seen the scope and the potential for a full-blooded PhD, into something major. Eventually, in one case, the undergraduate student not only did a PhD and a post-doctoral fellowship but now is on the staff of

Strathclyde University specialising in conservation science directly from an undergraduate project.

Dr May: I think that this probably represents the difference between where we come from in terms of our backgrounds. Certainly undergraduate students do projects in their final year in conservation or, in my case, in stone microbiology, but it does not really very often lead to anything beyond that. Except where there is perhaps a link with a local heritage organisation such as the Mary Rose Trust, leading to a possible PhD programme. It tends to be something that they do for general interest because they have been stimulated by hearing about the sort of research that goes on.

Q171 Baroness Platt of Writtle: Earlier you emphasised the importance of the research councils. AHRC appears now to be taking responsibility for championing conservation science. What impact will that have on your work? Do you believe that they are competent to administer cutting-edge scientific research across the span of cultural heritage, both moveable and immovable? If not, which research council would you prefer?

Professor Pollard: It is a very difficult question to answer delicately. They are very well placed to be the lead body on this because after all they are the body which is charged with the arts and humanities and a lot of the material we are looking at is in some way related to arts and humanities. The difficulty is that although the aim of the project is related to arts and humanities, the methods are often very much chemistry, microbiology, all that.

Q172 Baroness Platt of Writtle: Hard-cutting science.

Professor Pollard: Yes; hard-cutting science. So there has to be some mechanism whereby the science element is valued and recognised for a start—not just the expensive bit at the end, which is the dangerous thing—and also is given proper scrutiny because the danger of a review process which goes through a council not set up to deal with that material is that it does not get full review by proper experts. There are other ramifications. NERC, for instance, has a very good system of scientific service support that you can call on. If you want to make 15 radiocarbon dates or whatever, there is a process for getting that. That entire infrastructure is there in some of the other research councils and that is currently largely lacking in AHRC, although they do buy into certain facilities. The answer is not therefore to look round and ask which research council could be better, because there are also difficulties in giving this area fully to NERC or EPSRC. The answer is to encourage—and I know this is the direction this is going in the meeting tomorrow—the research

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councils to work together and to find ways of not putting obstacles up, either willingly or unwillingly, to research which genuinely crosses several of these research council barriers. That is the challenge: not to look round and ask where might be better.

Q173 Baroness Platt of Writtle: How does the cutting edge come into that though, if it is AHRC, which you are rather suggesting?

Professor Pollard: AHRC is likely to be the lead body, but they have to take advice from the other research councils about what sort of scientific research is genuinely cutting edge. There is a dialogue to be had. The scientific research does not necessarily need to be cutting edge if it is trying to solve a problem for which an adequately developed body of knowledge is there. There is a whole spectrum of needing brand new cutting-edge science to solve problems through to the intelligent use of very well-established techniques to answer serious questions. That is the spectrum which has to be addressed.

Professor Brimblecombe: That is a spectrum of which AHRC really will occupy the end. The danger is that it will not be as interested in broad scientific developments related to heritage: it will become much more interested in the application of techniques. This can become almost parasitic in some fields. If you just utilise analytical techniques, the field becomes known for its utilisation of tools rather than developing new ideas. The danger with cultural heritage science is that it does not become innovative and cutting edge. AHRC is going to have to think really carefully about how to put it at the cutting edge.

Dr May: Where this is leading, really, is towards some sort of facilitator who allows the Research Councils to work together. It would help also to make it clear to museums what facilities are available through the central laboratory service. This would help a great deal. Whether it is an individual or whether it is a panel, it would be an arrangement which would allow the research councils to work together. It obviously depends how the science is assessed within the Arts and Humanities Research Council applications, but clearly there may be concerns about second-class science developing. We need to preserve the quality of the science we do.

Professor Tennent: May I concur with what has been said, but specifically say that perhaps it is not entirely so important where it ends up, where it should be, as where there is a possibility of ring-fencing some conservation science funding and with that ensuring absolutely top class review of potential research projects. To have direct access to a dedicated pool of money within some framework and thereafter to let the academic system for quality assurance work

would seem to be the requirements. How they are achieved is the question of course.

Professor Pollard: May I take the Committee back 35 years for one second and just say that where we are now reminds me very much of the situation in the research councils in the early 1970s where it was perceived in this case that archaeology was a subject area which fell between the gap of the then Science Research Council and the other research council. The Royal Society and the British Academy got together and did a review and recommended that a science-based archaeology committee be set up within the research councils exactly to deal with this interdisciplinary area. I am not sure that is the solution now because everything has changed 35 years later, but I just find it amusing that we are back to the position we were in the early 1970s of trying to decide how a body of research which does not fit any of the research council specifications should get funded. Nothing is new in this world.

Q174 Lord Chorley: Did it work for 35 years?

Professor Pollard: Yes, I think it did; for 30-odd years and it was so successful that now in my area of scientific archaeology the UK is regarded widely as a world leader because of this initiative, this sort of structure which was set up 34 years ago to support it.

Professor Tennent: This is absolutely so, but there was an evolution because the science-based archaeology committee initially did not feel that paintings or objects in museums were relevant to its purview.

Professor Pollard: I raised it as an analogy.

Q175 Baroness Hilton of Eggardon: There are various alternative ways of providing some sort of centre. You have been arguing in favour of an institute and Professor Tennent has been arguing in favour of an educated stream of funding, which was a question I was originally going to ask. It does seem to me that there is a curious lack of a common database about conservation science and that does seem to be one way of providing some sort of central strategic thing, or at least answering Professor Brimblecombe's point about research being blue skies, whereas techniques perhaps should be something which are just available to people when they need to solve a particular problem. If there were a decent database they could just look up what the appropriate technique was, whereas scientific research should be perhaps something much wider and more hypothetical. Does that seem a relevant question to you all?

Professor Tennent: May I say that quantification and analysis of the situation is, from my perspective, paramount and that to progress one absolutely needs information which is not currently easily and readily available because of the lack of quantification of the

current provision. Attempts have been made in the past and it is very easy to make a brave attempt and find that it is very quickly out of date. Research projects come and go, scientists come and go and there even was an internationally co-ordinated attempt to provide information on conservation research internationally. It rather failed because it was an enormous task. To quantify the situation in Britain strikes me as a rather straightforward task in principle and would be absolutely the basis for progressing on whichever other topic we have already been discussing.

Q176 Baroness Finlay of Llandaff: Am I right that there is no British Association of Conservation Science?

Professor Pollard: No, I think that is incorrect. I believe that ICON, the Institute of Conservation, has set up within it a group of conservation scientists and although this is just a newly emerging thing, this is under way. You may have been right a year or two ago, but I think the situation has altered.

Q177 Baroness Finlay of Llandaff: Are you all members?

Professor Brimblecombe: No.

Professor Pollard: No.

Dr May: No.

Q178 Baroness Finlay of Llandaff: Why not?

Professor Pollard: I have not been invited.

Baroness Finlay of Llandaff: Surely if you are going to have somewhere which brings people together and expertise is known, you need to have an association with a journal, a website and an annual conference where people meet each other, bump into each other and hear about who is doing what. It strikes me that does not fit.

Q179 Chairman: In addition to ICON, the Institute for Conservation, there is also an Institute for Conservation Science. When we had a seminar at Hampton Court which you did not attend—

Professor Tennent: I think that the intention is that the Institute for Conservation Science, which has existed for some years, will be subsumed as a group within ICON, the newly formed institute, of which I believe there are something like 140 members of the science group. Indeed, to answer the question you have not asked, I am not a member.

Dr May: Within my research fields it is very much a question of networking through conferences or symposia held within my particular area. Traditionally that is how it has been done. You get a series of conferences, in my case, the stone conferences which are held every two to three years, or heritage microbiology meetings, which started in

the last seven or eight years. These are the situations where you can actually network. However, you are quite right that there could be a need for us to feel part of a bigger community within the UK.

Q180 Baroness Finlay of Llandaff: It is just that an institute tends to be full-time occupied, whereas if you have an association you can have associate members who have an interest, who have a few students doing something related and you suddenly expand the community of people who may be interested, particularly if it produces its own journal with different streams of science-based reports in it.

Professor Brimblecombe: I have gone to ICON meetings and have valued them and there have not been very many because it is a very new organisation. What is happening at the moment, and I have talked with some of the people who are trying to organise ICON, is that it is largely servicing conservators rather than seeing itself as a research organisation. I have this rather uneasy relationship with ICON.

Professor Pollard: Many of us here—perhaps Professor Tennent is the exception—have a range of interests, of which conservation science is one. If we joined every organisation that we probably could, we would spend our entire lives travelling round from exotic meeting to exotic meeting—it does begin to sound attractive. There is a structural issue within conservation science.

Q181 Lord Redesdale: Is the responsive mode of funding helpful to preserving the heritage? Do you think it should be changed to much more basic long-term funding?

Professor Pollard: My view is that the responsive mode is not very good for this sort of area, for a number of reasons. One is that a lot of the issues are short-term problem solving and that just does not suit going to blue skies funding. The other thing is that a lot of the questions we wish to ask are rather difficult to express in the general theoretical framework that you would expect to put together if you were going for mainstream scientific funding. We have rather general questions about what happens if this happens to that, whereas if you are an earth scientist you can express it very formulaically, you can have a model and a theory and you can test it. In that sense we lack a general model of conservation science theory. I do not think that the sort of research we need to do is actually very well suited to those responsive mode frameworks. My view would be that a very effective way of dealing with it would be to set up a thematic programme with a budget over five years with some thematic headings within it about needing to know more about stone, or needing to know more about Glasgow or whatever the thematic

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areas within it are, and have people bid into that in a thematic mode rather than responsive mode.

Professor Brimblecombe: If you think of it, money is always tight. Under responsive mode you get a whole lot of bids which exceed the money you have available, so what a research council does is return more to its core objectives and the things which get weeded out are likely to be these rather more what I see as imaginative projects, which make interconnections as the heritage science does.

Professor Tennent: May I make one point which is rather an extreme one? Quite simply, if the nation is serious about preserving its cultural heritage, it has to be serious about its conservation and science provision and it therefore has to look seriously at redressing the imbalance which exists between the needs and the research which exists within the institutions themselves set up to preserve cultural heritage, in other words museums.

Q182 Baroness Finlay of Llandaff: What is your experience of the process whereby results from research are disseminated out into the conservation community and where new applications are developed?

Dr May: In my experience, refereed journals are one way, but there is a whole series. If you work in a particular field you have to make contact with the community through trade journals, possibly through newspaper articles or television. It is actually education of people about your findings. On the European front, I must confess that the need is to persuade conservators that the research I am doing is relevant to what they need. In that respect, the consortium I co-ordinated made a point of involving conservators at the level of the research work so that they could spread the word about the results. There is a need to involve the community that is going to benefit in the long run from this type of research.

Professor Brimblecombe: It is absolutely vital that the output of research, which is, despite being good science, actually very practical, is converted into policy. I found that conservators and managers of heritage do not read scientific journals; in fact they hardly seem to read anything at all. The only way that I can really translate what I do into a policy change is by visiting them and almost shaking them and saying "Do you realise how vital it is? Dust inside historic properties does not come through the windows, it comes from your visitors. That means you have to change the way in which you route visitors through properties". They do not read that in a scientific journal, but they get it when you stand in front of them and they change policy.

Q183 Baroness Finlay of Llandaff: How are we going to improve the situation? You are telling me what is wrong but now we need some positive suggestions. We have heard that there is a sense coming from witnesses that the Partnerships for Public Engagement type of programme is too bureaucratic in terms of applying for money for this translation of science into practical application. I wonder whether you feel that the research councils are helping or actually hindering such a process of knowledge transfer. I want to know what needs to be done.

Professor Tennent: It is a difficult question because the whole business of dissemination is multi-faceted. There is the aspect that Professor Brimblecombe has been relating and that is the policy situation and there is the basic aspect that the science which is done has to reach the conservator who enacts those results in some way by means of preventive or interactive conservation. There are journals aplenty for communicating this. One of the difficulties is that universities are driven away from the conservation journals towards academically rated journals because the premier journal in conservation, *Studies in Conservation*, does not carry an academic rating which makes it worthwhile to publish in that organ.

Q184 Baroness Finlay of Llandaff: So the RAE works against you.

Professor Tennent: Yes, the RAE works against it. As a result, much valuable conservation research tends to get buried or is difficult to find because it is published in obscure or not mainstream conservation journals, but scientific journals. I have done likewise.

Professor Pollard: That is absolutely right and it goes further than that: it is about the promotion structure of conservators/conservation scientists within universities. If you publish in the places where your material has the best chance of impacting on the audience that you want it to impact on, then your chances of promotion are pretty minimal because any promotion committee will look at your publication list and say you publish in conferences, you publish in these journals with 0.8 impact factor and ask what you are playing at.

Q185 Baroness Finlay of Llandaff: So we are back to needing a high impact journal, are we?

Professor Tennent: Are we?

Professor Pollard: It is not as simple as that. Impact factor is basically based on the number of people who read it and the number of times they quote it. If you ever wonder why medical scientists are always highly supported and funded, it is because there is a huge community of them which keeps quoting everybody's article so the impact factor goes up. It is to do with the size and the dispersion of the community.

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Professor Brimblecombe: Remember that impact factors are about who writes about your work, not who uses it. That is the really sad thing. What we are talking about now is the use.

Q186 Chairman: May I move on to collaboration with museums. The Natural History Museum has had analogue status for quite a long time with regard to the EPSRC and the AHRC has recently granted analogue status to a number of other national museums. How important a part does collaboration with such academic analogues play within university research programmes? You touched on this a little when we were looking at interns and PhD programmes, but I wonder whether you would like to comment a little bit more on this.

Professor Pollard: It is probably a little early to tell. I can say that the Natural History Museum, which has had academic analogue status for a number of years, is always a very valuable partner in any research, not in the conservation science area, but in other work that I do. We always try to collaborate with the Natural History Museum, if it is appropriate. I think the new movement within AHRC to give academic analogue status to other institutions will be very valuable, but it will take some time to affect academic behaviour.

Professor Tennent: Absolutely and I would encourage this as an important step for the national museum/university interaction. In a sense the question thereafter arises that there are many important non-national museums. Is it fair that the national museums would be the focus for that special relationship, university/museum?

Dr May: Within Portsmouth the historic dockyard is a significant part of UK culture and what we have is a number of research programmes going on within the Mary Rose Trust, for instance, which are funded by HLF in a big way. Analogue status for them would mean that they could apply for other money. However I should also like to express a note of caution. What we hope for is that the museums will come to universities in order to get some sort of interaction which will maintain the diversity of funding that we have been talking about.

Q187 Chairman: We were talking earlier about the significance of hard science and the general view of conservation science here. Is analogue status within the AHRC as distinct from EPSRC significant?

Professor Pollard: It goes back to the question that was asked about the appropriateness of AHRC being the lead body within the research councils. My understanding is that the research councils are attempting to work much more closely together across the piece and if there are bits of research which are relevant to one or the other, then they will

collaborate. My hope would be that AHRC giving analogue status to the national museums would mean that they had equivalent analogue status within the other research councils and that would make absolute sense.

Q188 Chairman: What in your view is the quality of the science coming out of the science departments of major national museums and galleries?

Professor Pollard: I can answer by example. The National Gallery has for many years been the internationally recognised leader in areas of paintings analysis and particularly organic materials used in paintings. Some of them are international leaders in cutting-edge science. My guess is that other museums have tended to focus more on museum-based problem solving and that may be equally valuable and highly appropriate, but it tends not to get out into the broader community.

Professor Tennent: May I put a refinement on that? The national museums in Britain are centres of excellence which can hold their heads high on a world level; I am sure of that. The question remains: what exactly is the science that is taking place there? In many cases that is as much for art historical reasons as for the preservation of the collections. That begs a major question which no-one has yet quite got to the bottom of: what precisely is conservation science? It does embody the need to do analysis of the constituents of materials as well. Again the quantification is absent, but it is fair to say that there is as much analysis science in the museums in the UK that is not of particularly special importance for enhancing the preservation of the collections as there is directly targeted conservation science. That is a sweeping statement: it would be wonderful to quantify it.

Q189 Lord Redesdale: The written evidence from RCUK refers to the decline in museum-based science along with the increasing complexity of the basic science underpinning conservation and notes that it may become increasingly difficult for organisations conducting cutting-edge research such as the CCLRC to engage with museums. What can be done to bridge this gap?

Dr May: I did mention earlier the interaction between the central laboratories and museums. It does point towards again having a facilitator of some description who can go out from the central laboratories to inform museums what they can do for them. My understanding is that this does happen in France quite successfully. There is obviously a need to have somebody who can actually explain what benefits there might be in having collaboration. I have to say that this collaboration is extremely productive; in kind it is worth a lot to people who do

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not have a constant income stream. In our own university just recently someone has actually got the equivalent of £96,000 of support in kind from the central laboratories. This can actually be quite significant.

Professor Brimblecombe: This is one side of the argument, but the other requirement really is that museums do have good scientists working there. We have already looked at the kind of educational programme and the danger of attracting only people who have strong art historical backgrounds rather than attracting good scientists in this field. If we are going to see science flourish in museums and be able to use the facilities, we have to have good scientists.

Q190 Lord Redesdale: In the evidence given by Professor Tennent he says “Each of the UK conservation science departments is below an effective critical mass”. Would you then say that conservation science is in a form of crisis?

Professor Tennent: I suppose it depends how one defines crisis. Certainly if one defines it as giving adequate scientific basis for the needs of our nation’s cultural heritage, I would say that it is in a major crisis. Of course it is not an obvious crisis in some ways. If a building crumbles away through lack of scientific knowledge, is a cause and effect relationship established? Not always. This is one of the problems. The direct relationship between conservation science and the better conservation of our nation’s heritage is sometimes difficult to establish. However, it is certainly true that it would be easy to rationalise what an effective critical mass would be for our nation’s museums and it would be easy to begin to rationalise whether experts in one topic, working in one national museum, might equally well result in the need for no expert in that topic at another. In other words, at present there is probably duplication of effort which would be no bad thing if there were not an omission of effort.

Dr May: In cultural heritage there is a crisis in Europe. Over the last few years we have had serious problems and meetings in London, and before that in Brussels, have identified that the lack of support from Europe makes a big difference to what goes on nationally. We need to consider this urgently because of a vacuum of support at the European level. We have been benefiting from European funding in the UK over the last few years; the Research Councils, the Government, have not really put serious money into this particular area directly so we have relied on that. Now it is actually declining and that is going to create a crisis in the UK. Certainly it has been identified at the European level.

Professor Brimblecombe: The sense of crisis really comes about through the lack of a vision of what the future will hold. There is no sense of continuity at the moment.

Professor Tennent: May I give one example, because I do believe examples can be effective? At a major conservation conference in September I shall be presenting the situation that Britain has lost vital elements of its stained glass cultural heritage made in the 1960s through lack of technological information. The whole of the glazing scheme in Sheffield cathedral, the whole of the glazing scheme in Blackburn cathedral, both made in the 1960s, deteriorated by the 1970s and in a skip through lack of technological information by the 1980s. This is the crisis. There is no expert to be called upon; there is no mechanism for that expert to be called upon, even if the expert existed, to avoid that situation. The situation is not just these cathedrals. The Winston Churchill memorial screen in Dudley near Birmingham is in storage, never to be displayed again; a major international work of art and of great importance to this country. No technological information on adhesives for that purpose exists within the conservation community to be able to categorically restore that or prevent its deterioration. This is the situation.

Q191 Baroness Platt of Writtle: Post-graduate research programmes in conservation science have declined substantially in this country, yet the UK did not participate in the recent Europe-wide initiative to launch a PhD programme in conservation science. Why not? What is the long-term outlook for university-based research in this field?

Professor Tennent: As one who did participate, wearing my Amsterdam University hat, perhaps I may be permitted to answer that question initially. The first simple and rather unfortunate answer is that often European grants are established on the basis of an old-boy network and if one is not in that particular old-boy network, one misses the boat. The United Kingdom missed the boat. It is no more complex than that. However, it is indeed an important initiative and there are also lessons to be learned from that initiative, one of which I may briefly draw, though not directly relevant to your question. That is a two-phase project; most unusual. The European Commission established through its Leonardo scheme an assessment of the need for PhDs in conservation science and then, through a completely different route—it had to be a completely different route—and, through the tenacity of the co-ordinating partner, funds were found through the Marie Curie fellowship scheme for enacting the results of phase one. The results will have implications Europe-wide, not just for the partner

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countries but wider than that, and Britain should be in there.

Professor Pollard: This issue goes slightly deeper than that. In most British universities the bread and butter is the undergraduate business; that is what pays the bills. It would be rather unusual to see Masters or PhD programmes grow independently of a body of undergraduates doing either conservation or conservation science. I was external examiner on the conservation science degree at Leicester De Montfort and that was an absolutely excellent course. I also taught on the undergraduate degree in conservation at Cardiff many years ago. The pressure on these undergraduate degrees is simply one of finance; that it costs so much because of the laboratory requirements you need, because of the staffing requirements, the staffing ratios you need. These courses are very expensive to run and in an accountant-driven university system there is just so much pressure to pull out. I believe that is what happened to De Montfort and that was a very serious loss. I wonder whether some scheme in conservation and conservation science like HEFCE runs for specialist subject areas such as Russian, which is subsidised in those universities which teach it because it is regarded as a key discipline, but is not going to pay its way purely in the volume of

students you can get through the door, should be viewed through HEFCE as one of these supportable disciplines within British universities. Without the undergraduate underpinning, you will always struggle to get any coherent Masters level or PhD level provision.

Dr May: I agree with that because MSc teaching is expensive for universities and, certainly in our institution, it is quite difficult to run the courses, though we do run two. Some sort of studentship system, with money coming in from outside, would certainly benefit the courses and the whole discipline.

Professor Brimblecombe: I would probably argue that we still want to attract scientists who have done their undergraduate degrees in pure sciences into the field of conservation science.

Chairman: May I thank you very much indeed? I should like to thank you very, very much indeed for coming to see us and giving us the benefit of your thoughts on all these issues. For us it is extremely valuable to have had you here. Should there be anything which comes up where you would like to add to what you said, please do not hesitate to write to us; we should be very glad to have any further thoughts that you have. Again, thank you very much indeed for coming.

TUESDAY 25 APRIL 2006

Present	Chorley, L. Finlay of Llandaff, B.	Hilton of Eggardon, B. Sharp of Guildford, B. (Chairman)
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Memorandum by the Museum Documentation Association

1. INTRODUCTION

1.1 The Museum Documentation Association (MDA) is the UK's lead organisation for knowledge and information management in museums, galleries and heritage sites (hereafter "museums"). MDA is funded in England by the Museums, Libraries and Archives Council (MLA), in Wales by CyMAL through the Welsh Museums Federation and in Scotland by the Scottish Museums Council (SMC).

1.2 Documentation is the name given to the technical practice of cataloguing and information management in museums. It is the process by which heritage institutions establish legal title to the objects in their care, and ensure that they are well-managed as part of their collections.

1.3 A significant proportion of expenditure on heritage collections is attributable to documentation, in the form of staff capacity and systems procurement. This represents an investment in excess of £1 billion over the next decade from both the public and private sectors.

1.4 MDA's key areas of expertise relate to the use of new technologies in the heritage sector. For this reason, the following paper focuses on the role of ICT in the heritage sector, and particularly as a mechanism for supporting public engagement while minimising the impact on long-term conservation.

2. THE ROLE OF MDA & DOCUMENTATION

2.1 MDA's work is driven by a vision of a sector in which collections are managed effectively and in accordance with national standards to create inspiring, accessible and sustainable services for users. Much of this work is closely concerned with the use of ICT as a way of enabling the public to engage with collections.

2.2 The vast majority of museums now have some form of electronic Collections Management System in place. In many cases, this System is the focus of their use of ICT (other than the usual office productivity applications). Much of the existing ICT infrastructure is therefore devoted to the management of information about collections.

2.3 Until recently, this information has predominantly been used for internal stock-control and management processes. Traditional approaches to documentation have focused on recording information about legal status, location, transfer and interventive processes such as conservation or preservation.

2.4 Increasingly, however, museums are making this information available online. The majority of systems suppliers now provide 'modules' which enable museums to publish their information online in the form of searchable databases.

2.5 The benefit of this process is that it is making available much more information about the significant proportion of museum collections that are not on display. The disadvantage is that it is highlighting the lack of descriptive and interpretive information held in management records.

2.6 While there is a significant increase in the amount of collections information available online, this has not necessarily been matched by improvements in its quality. The next stage of development will involve the creation of richer, more descriptive information which can be used to meet the needs of users. MDA is supporting this process in a number of key areas:

- MDA is implementing a research and advocacy campaign called *Collections for All*. The campaign is providing evidence of the social, intellectual, professional and economic impact of knowledge about collections. The key aim of the campaign is to demonstrate the value of collections information to the public;
- MDA and the London Museums, Libraries and Archives Council (ALM London) are developing a joint initiative called *Documentation for Diversity* which provides tools and standards for museums to revisit their collections information and interpret it to meet the needs of diverse communities;

- MDA provides a service called *SPECTRUM Terminology* which helps cultural organisations to develop standard terms to describe their collections. These in turn help to create new approaches to searching for collections information online;
- MDA and the Museums Copyright Group (MCG) are collaborating on a national strategy which will help cultural organisations to control the publication and re-use of their information online;
- MDA has been commissioned by the British Education and Communications Technology Agency (BECTA) to produce a feasibility study on new approaches to licensing cultural content for use by schools, teachers and learners;
- MDA publishes SPECTRUM, the international standard for knowledge management in museums. The aim of the standard is to ensure that museums manage their knowledge and information effectively and are able to publish it;
- MDA is developing an XML format based on SPECTRUM which will allow information from different museum systems to be brought together and published through online services;
- MDA works with MDA Partners (commercial suppliers) to validate software for compliance with SPECTRUM, thereby ensuring that professional tools support the publication of information by cultural organisations;
- MDA provides training to thousands of museum professionals each year. This training develops professional skills in interpreting collections information and managing it as knowledge which can be used to create online services.

3. RESPONSES

3.1 *In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?*

“Objects receive their significance only through the thoughts that cluster around them”¹

An object of cultural importance consists of two elements. First, there is the physical object. Second, there is the information about what the object is, where it is from, who owned it and all the other elements which combine to make it significant. Very often, without the information about the history of the object, its significance is lost.

IT contributes to engagement with objects of cultural importance in three main ways:

- (a) It enables museums to collect and store the information about an object and to keep a record of its history;
- (b) It enables museums to take a long-term approach to the management and conservation of the objects in its care; and
- (c) It provides new channels for publication and broadcast of this information, which in turn increases public access and engagement with the objects themselves.

IT can enable access to published information about an object. This increases the audience for that object without subjecting it to physical intervention which might impact on its long-term preservation.

However, simple access to information is often not sufficient to secure engagement. Museums are beginning to explore the new opportunities created by IT for bringing this information together and presenting it in ways that encourage and facilitate interaction. These include, for example, online exhibitions, ‘self-curated’ exhibitions of digital material or the incorporation of object information into other services such as digital television or 3rd generation mobile services.

If information is understood as the “raw material”, then IT provides a mechanism for shaping this material into user-focused services.

The other great advantage of IT is that it enables a much more targeted approach to the “user”. For example, MDA’s work on classification and tagging is helping museums to create information that is targeted to different parts of the National Curriculum. This means that teachers and schoolchildren are able to incorporate heritage information—and hence museum objects—into their learning.

3.2 *Is there scope for improving the use that UK galleries, museums and others make of such technology?*

There is tremendous scope for improvement. In reality, the heritage sector is at the earliest stages in learning about what IT can offer and how this potential can be harnessed. The process to date has followed the classic learning-curve of any industry that is engaging with new and particularly online technologies. The use of these

¹ Boas, F., *Some Principles of Museum Administration*. Science, 1907. 25(650): p. 921-933.

technologies has moved from a model based on passive marketing to one that is much more about publishing, engagement and interaction.

A particular issue in the level of engagement with IT in the sector arises from the nature of available funding. Most sector investment has been project-based with clearly defined outcomes. While this has enabled the creation of large amounts of digitised material, it has left relatively little investment in Research & Development. This means that there is a gap between the available content and the sector's understanding of what the public want in the form of products and services.

It is worth noting that the only sustained investment in R&D activity is made by commercial organisations, the benefit of which is only passed directly through to their clients rather than the sector as a whole.

Museums have tended to take responsibility for the creation of 'home-grown' services which meet specific organisational needs. They have not tended to engage with the commercial/private sector, particularly around the delivery of IT-based services. There is a tremendous opportunity for museums to benefit from the large-scale investment which this sector has made already in developing these services. A clear example is the sector's drive to create its own 'search engine' for collections information rather than engaging with sector leaders such as Google or Yahoo which enjoy far greater market share.

The three key areas for improvement, therefore are:

- Developing skills in both IT management and content creation to ensure that people are equipped to create engaging services and sufficiently skilled to identify opportunities;
- Sustained investment in Research & Development both to support product innovation and to engage with the public's needs and expectations; and
- Forging partnerships with the private sector which ensure that heritage organisations and their information are apparent within existing services and able to benefit from sustainable investment and market penetration.

3.3 *What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?*

The examples are many and varied, however, MDA has selected the following on the basis that each illustrates a different aspect of the potential application of IT to support engagement with cultural material.

Tate iMap

<http://www.tate.org.uk/imap>

The award-winning iMap project from the Tate took an entirely new approach to presenting museum objects online. The focus of the project was to enable access to visual arts (in this case, paintings) for the visually impaired.

To achieve this, Tate worked with visually impaired people and artists to break the images down into their constituent parts (colour, tone, line, composition) and present these in ways which partially-sighted people could engage with. As well as presenting this information visually onscreen it is possible to download and print off tactile images which illustrate the main points.

The important lesson from the iMap project was its user-led approach. Tate allowed users to define their expectations in terms of online engagement, and this in turn created a rich and intuitive interface to the information.

24 Hour Museum

<http://www.24hourmuseum.org.uk>

Created in as the first virtual national museum, the 24 Hour Museum exists to promote public engagement with cultural heritage.

By adopting a journalistic and user-focused approach, the 24 Hour Museum has succeeded in creating a portal to museum information that is used by over 1 million people a month, both nationally and internationally.

The 24 Hour Museum has also led the way in creating innovative 'location-based' services based on heritage information. Through their *City Guides* (funded by DCMS through Culture Online), they are enabling people to use cultural information to enhance their sense of place and community.

Birmingham Museums & Art Gallery—BMAGiC

<http://www.bmagic.org.uk>

BMAGiC is a service from Birmingham Museums & Art Gallery which demonstrates the next stage in the evolution of online collections databases. BMAG have provided an intuitive and user-friendly interface which allows users to search their entire collection, and to find relevant information and images.

At the same time, BMAG have taken lessons from the private sector and enhanced their interface to add value to the user experience. Additional functions include Amazon-style automated recommendations, 'themed' pathways through the content and the ability to create a personalised online service.

Fitzwilliam eGuide

<http://www.fitzmuseum.cam.ac.uk/projects/eguide/fitzwireless.html>

The eGuide project at the Fitzwilliam Museum in Cambridge is demonstrating the application of mobile and handheld computing to museum collections.

The innovative project, developed in partnership with a Cambridge-based IT company, provides museum visitors with a handheld computer through which they can access collections information as they move around the galleries.

The ultimate aim is to enable visitors to use their own IT equipment (handhelds, mobile phones, gaming platforms) to access information as an intrinsic part of their visit. The Fitzwilliam hope that this will extend the value of the visit beyond the museums walls and encourage repeated use.

4. MUSEUM COLLECTIONS, SCIENCE AND TECHNOLOGY

4.1 In addition to the specific applications of IT to support engagement, there are a number of areas in which collections information is able to support the Science and Technology sectors. These include:

- Documented information about Natural Science collections provides a unique source of reference material for a number of research priorities including biodiversity, climate change and species variegation;
- Information about collections has provided reference material for product development in sectors such as the materials, textile and pharmaceutical industries;
- Documented information about the assessment and treatment of collections (including preventive conservation) provides an ongoing record of the impact both of new technologies for preservation and of environmental factors such as pollution control;
- Documented information has also found direct practical application, for example in the use of recorded sites of unexploded WWII munitions as a reference for the construction industry;
- Collections information is able to address not only history-related elements of the National Curriculum, but also basic skills (literacy, numeracy) which are essential to Science and Technology teaching.

10 February 2006

Memorandum by the British Library

INTRODUCTION

1. The British Library (BL) welcomes the opportunity to provide written evidence to the House of Lords Science and Technology Committee to assist in its inquiry into Science and Heritage.

THE BRITISH LIBRARY

2. The British Library was established by statute in 1972 as the national library of the United Kingdom. The BL is one of the world's greatest research libraries and the main custodian of the nation's cultural heritage. The BL's incomparable collections have developed over 250 years; they cover three millennia of recorded knowledge and represent every known written language and every aspect of human thought. The BL is the beneficiary of legal deposit, and it also purchases widely with a £16 million annual budget for material of research value. It is estimated there are well over 150 million items in the collection; these occupy over 600km of shelving.

3. The British Library is funded from the vote of the Department for Culture, Media and Sport (DCMS). In the current financial year (2005–06), the BL will receive £99.9 million in grant-in-aid from DCMS and it expects to receive £29.6 million in self-generated income from the provision of priced services, donations, etc, enabling it to build, preserve and provide access to its collections in support of research, business, the wider library network and wider educational goals, through its reading rooms, through its exhibition galleries, educational programmes and loans to other institutions, through its remote document supply services, and through provision of information and bibliographic services. The BL occupies a prominent place in the intellectual and cultural life of the nation. It is an integral component of the research infrastructure and it plays a correspondingly significant role in ensuring the research excellence of the UK and in supporting creativity and innovation. A recent independent economic impact study commissioned by the BL suggests that the total value added to the UK economy by the Library each year is at least £363 million, over £4.40 for every £1 of public funding.²

4. The British Library serves five principal user groups—researchers, the business community, the UK library and information network, education and the general public. The BL has a close working relationship with public libraries. Each year, we receive around 400,000 visits to the reading rooms, some 5,500,000 collection items are consulted in the reading rooms or are supplied via the BL’s document supply service to remote users, and nearly 15,000,000 searches are made of our public catalogue. We also receive over 600,000 visitors to our onsite and ‘virtual’ exhibitions. Over 2,900,000 people overall access the BL’s website (31.5 million page hits) each year.

CONSERVATION AND PRESERVATION AT THE BRITISH LIBRARY

5. In caring for its collections, the British Library operates a “mixed economy”, combining in-house conservation expertise that is not available on the required scale externally, with outsourced routine operations that can be provided more cost-effectively externally. The BL’s in-house Conservation³ department is the largest in the UK, with a budget of £2.37 million and ca 80 staff (£2.13 million staff costs and £244,000 equipment and materials). The department carries out interventive conservation across the whole range of BL collections, from mediaeval manuscripts to Chinese scrolls to maps and printed material. The work ranges from refurbishment and making “phase-boxes” to the treatment of extremely friable birch bark fragments.

6. The Preservation⁴ department has a budget of £2.97 million in 2005–06. The majority of this (£2.42 million) is spent on contracts, with £514,000 spent on ca 20 staff who carry out work aimed at preventing damage to the collections. The contracts are mainly for the more routine treatments that are more cost-effectively carried out externally, together with some expert conservation in areas in which the BL does not, nor does it intend to have, expertise.

7. A major construction project is current under way to create a new, purpose-built Centre for Conservation on the British Library’s St Pancras site due to open in 2007. The rationale for the BL Conservation Centre is to turn an accommodation problem—whereby c.50 BL conservation staff remain based on the British Museum site in accommodation that is expensive, unfit for purpose, and on short leasehold and c.10 Sound Archive technical staff are housed in suboptimal short leasehold accommodation in Islington—into an opportunity. The new Centre has been explicitly designed to be a catalyst and enabler of change at the BL. An ambitious programme has been established that will result in state-of-the-art conservation studios, a visitor centre linked to the main exhibition galleries, public demonstrations and tours; improved conservation treatments and skills for the current cohort and new training courses for future book conservators. There will be improved materials testing and microscopic examination facilities, and more opportunities to convey the findings of conservation research to the public.

E-PRESERVATION AT THE BRITISH LIBRARY

8. The British Library takes a format-neutral approach to the stewardship of its collections. In parallel with the conservation and preservation of its traditional, physical collections, the BL is also deeply engaged in addressing the challenges of the preservation of its 200 Terabyte digital collection.

² *Measuring our Value: Results of an independent economic impact study commissioned by the British Library to measure the Library’s direct and indirect value to the UK economy* (December 2003).

³ Conservation: interventive treatment to collection items that have been damaged through use, and/or have deteriorated through chemical and environmental factors.

⁴ Preservation: activity aimed at preventing damage to the collections (such as training in handling, disaster preparedness, collection salvage, and risk mitigation). Also termed “preventive conservation”.

9. The Legal Deposit Libraries Act 2003, which extended the scope of legal deposit *inter alia* to electronic publications, received Royal Assent on 30 October 2003, and the BL has an *ex officio* seat on the Legal Deposit Advisory Panel which is charged with advising the Secretary of State for Culture, Media and Sport on the content and timing of Regulations under the Act.

10. In 2003, the BL was very instrumental in the establishment of the Digital Preservation Coalition (www.dpconline.org), formed by knowledge organisations concerned about the potential for the total loss of digital material. The Coalition now has 11 full members and 17 associate members. The Library's Chief Executive, Lynne Brindley, has taken a leading role in this area, being the founding chair of the Coalition, as well as the only non-US steering board member of the Library of Congress' \$100 million digital preservation programme NDIPP (National Digital Information Infrastructure and Preservation Program).

11. Within the British Library, the first digital preservation co-ordinator was created in 2003 and the first interdisciplinary digital preservation team in 2005. The BL's DOM (Digital Object Management) Programme was established to provide the Library with the means of handling the ever-increasing number of digital items in its collections, in accordance with business needs and strategy. The vision is to create a management system for digital objects that will store and preserve any type of digital material in perpetuity, provide access to this material to users with appropriate permissions, and ensure that users can, where possible, experience material with the original look and feel. The Library is also preparing for e-preservation through national and international collaborative projects, such as the UK Web Archiving Consortium.

12. The e-preservation of the documentary heritage is a new field of research. The British Library is moving from minor involvement in theoretical and demonstrator projects (such as CEDARs (www.leeds.ac.uk/cedars) and CAMiLEON (www.si.umich.edu/CAMiLEON) to leading on real time study of its digital collections. The Joint Information Systems Committee (JISC)-funded LIFE project (Life Cycle Information for e-Literature at www.ucl.ac.uk/lis/lifeproject) is a one year practical research project under the JISC 4/04 call collaboratively run by University College London and the BL. The project will define the life cycle of the collection and preservation of key digital collections at UCL and the BL and establish the costs of the individual stages in the cycle to show the full financial commitment of collecting digital materials over the long term. The exemplars at the BL include the study of the life cycle costs of the 200,000 digital objects received under voluntary legal deposit since 2000 and represents a new step in applied research.

13. The multi-million Euro digital preservation project, PLANETs (Preservation and Long-term Access through NETworked Services) was successful in the EU's 6th Research Framework Programme. (The British Library is leading the project consortium of 15 European national libraries and archives, universities and commercial organisations, including the Dutch national library and Microsoft). The aims are to enable organisations to take the steps necessary to ensure long-term access to their valued digital content and to create, evaluate, and execute preservation plans with a high level of automation. It will enable vendors to compete in a market place for differentiated preservation services and tools, and give European citizens confidence that their digital cultural and scientific heritage will be preserved and made accessible to future generations.

14. The project intends to achieve more by integrated effort and collaboration. This is a mainstay of the British Library's approach to e-preservation research. Another recent initiative is with Microsoft. The British Library is a founding member, and provides the vice-chair, of the technical committee that is defining an open standard for office file formats that will retain compatibility with Microsoft formats to address needs for ongoing interoperability and for long-term preservation. The BL does not consider that the sizable challenges of e-preservation can be solved in isolation and is actively collaborating in applied research with parallel libraries and archives, with universities and commercial organisations, nationally and internationally.

CO-ORDINATION OF CONSERVATION SCIENCE IN THE UK

15. In very general terms, the small amount of conservation science undertaken in UK libraries and archives has been mainly in areas specifically applicable to their individual collections. There is now an agreed, thematic framework for applied conservation research for the national libraries and archives, formulated from an initiative led by the British Library in conjunction with The National Archives, and funded by the United States Andrew W Mellon Foundation.

16. Until the early 2000s, the BL had undertaken specific conservation science to address the needs of its collection. For example, from the 1980s to early 1990s it had investigated paper strengthening using graft copolymerisation, and it had undertaken conservation science to address specific questions about BL collection items, for example, the analysis of berberine dyes in Chinese scrolls.

17. In 2002, the BL identified the need for conservation research applicable to caring for the collections in libraries and archives in the UK and internationally. In 2003, the BL appointed the first Head of Conservation Research in a UK library or archive; this was followed by the creation of a similar role at The National Archives. The BL produced a Conservation Research Strategy in 2004, identifying how science would underpin the conservation of the BL's collections and enhance knowledge of the collections:

The fundamental principle is that conservation research has to contribute directly to the long-term preservation of the physical collections, either by developing less interventive or more effective techniques for conservation, or by improving our ability to prevent damage to the collections. Wherever possible our tactic will be to form collaborative partnerships with other bodies, both nationally and internationally: libraries, archives or academic institutions, in order to maximise the use of resources and spread the workload.

Applied conservation research also supports the British Library's own research strategy by increasing knowledge about our collections; this provides an extra dimension to original research carried out by users of the library and by curators.

18. The BL attracted funding from the Andrew W Mellon Foundation for an international roundtable to produce a peer-agreed strategic framework of priorities for conservation research in the library and archive community in the next five years⁵. Under the BL's leadership, a collaborative national framework was produced with the other UK copyright libraries and The National Archives, and with a European and US dimension, aimed at securing external funding for a five-year programme. The themes that emerged are: the "life cycle of the collections", including life-cycle prediction, natural ageing of materials and the evaluation of preservation strategies; the effects of the storage environment, including the selection of the optimum environment for different materials; and the non-destructive methods for assessing damage to materials.

19. In fulfilment of the aims of the strategic framework, the BL has just been awarded US\$700,000 (one of the largest grants ever made for conservation research in the UK) from the Mellon Foundation for two projects. One project will research the condition of identical books in different nationally-significant libraries. Identical volumes held in the different environments of the six copyright libraries across the UK provide a unique research resource. The second project will research the emission of volatile organic acids by books and paper, again studying real time collections at the UK copyright libraries and The National Archives. The scientific analysis will be outsourced to the Centre for Sustainable Heritage at the Bartlett School of Architecture at University College London and to the University of Strathclyde.

20. The emphasis on applied conservation research and the collaborative, outward-looking approach reinforces many BL corporate strategies. The Library suggests that this model from the libraries and archives sector, whereby large institutions take the lead in thematic areas with the objective of networking, is appropriate for encouraging national and international collaboration across other sectors.

FUNDING OF UK CONSERVATION RESEARCH

21. Currently, conservation research is funded in a fragmented way, with funding for conservation research falling between funding for the arts, funding for the humanities, and funding for the sciences. It is one of the great strengths of conservation and conservation science that they span the arts and sciences, but it is a weakness when it comes to funding. In the past, conservation research has been perceived as being too scientific to attract funding from arts funding bodies, but not scientific enough to attract funding from science funding bodies. Current Research Council expenditure on Conservation Science in 2006–07 is estimated to be in the order of £2 million. The formation of the Arts and Humanities Research Council (AHRC), and its declared willingness to fund conservation and conservation research, is a notable step forward⁶. There has also been the problem of getting the results of conservation research into the hands of practitioners. Academics need to have their research published in journals with a high impact rating, but these tend not to be read by conservators. Journals which are read by conservators do not have high impact ratings and are therefore not favoured by academics.

22. A number of leading cultural heritage organisations met in November 2005 at West Dean College because they considered that the conservation research was not adequately funded nor necessarily focused in the right direction. The heads of conservation from museums, galleries, libraries, archives and universities across the movable and immovable heritage, commissioned a study, which will be available in February, to scope the current funding of conservation research in the UK. The West Dean meeting reinforced the need for:

— a strong, clear, and dedicated funding stream;

⁵ The roundtable resulted in publication of "The Future Life of Collections" (<http://www.bl.uk/about/collectioncare/pdf/futurelife.pdf>)

⁶ It was recently announced that the British Library had been awarded Academic Analogue status by the Arts and Humanities Research Council (AHRC) from April 2006 until March 2011.

- the development of a national strategy for conservation and science research by a network of leading institutions based on common needs while recognising their diversity; and
- a mechanism and structure to capture a range of data for reproducibility and reuse, with the aim of making the data more readily and widely available.

THE UK CONSERVATION SKILL BASE

23. With regard to the UK skill base, there are currently less than five Conservation Scientists working in libraries and archives as researchers in the UK. In establishing the first head of conservation research, the BL was very clear that good communication and “translation” of science was required, not least, to convey what one professor of chemistry at the Mellon Roundtable termed the unique “romance” of the collections. It is unrealistic to expect that conservation research posts will be created in any but the largest university libraries, given the constraints on library funding and the fact that their conservation/preservation departments are often small. Nevertheless, conservation researchers in university libraries are well placed to exploit opportunities for collaboration with their universities’ science departments.

24. Over the next five years, 12 per cent of the BL’s Collection Care staff overall will be retiring, and the impact of these age retirements will fall disproportionately on Conservation, where 19 per cent of the staff are due to retire, and on Book Conservation, where 25 per cent of the staff are due to retire. Many of these conservators have decades of experience and were trained in a way unavailable today. The BL was so concerned about the diminishing skill base available to conserve the libraries’ collections for future generations, that it undertook primary research into the need for book conservation in the future, nationally and internationally. The research concluded⁷ that not only is there a clear quantifiable need, but also that the BL is uniquely placed to contribute to the training with its unparalleled skill base. Therefore, a fundamental element of the new BL Centre for Conservation is the incorporation of training, in the form of advanced internships and collaborative degrees, to address this recognised gap in conservation training provision in the UK. This parallels the Heritage Lottery Fund’s identification of the renewal of craft skills as being of strategic national heritage importance.

25. The BL is taking a leadership role in book conservation training. Active discussions with universities to partner with the BL in establishing the first Foundation Degree in Book Conservation are under way. The BL would provide the practical training for the Foundation Degree, with designated studio space and “training for the trainers” (with, for example, NVQs), ahead of moving to the new Centre for Conservation in 2007. In addition, a programme of British Library internships (with bursaries funded by HLF) will build on the modest *ad hoc* internships and placements accommodated currently.

UK STANDING AND LEADERSHIP IN THE APPLICATION OF CONSERVATION RESEARCH

26. As noted above (Para 18), the BL initiated and led the international gathering that produced the UK framework for applied conservation research in libraries and archives. The different scientific cultural heritage institutions in the Netherlands are engaged in a strategic planning exercise and used the model of the UK meeting. Many of the participants of the International Roundtable are engaged in EU-funded projects such as PaperTreat (www.science4heritage.org/papertreat) and SurveNIR (www.science4heritage.org/survenir), led by the National Library of Slovenia which is currently playing a significant role in applied conservation science.

27. Conservation science takes ideas from many different scientific sectors and adapts them for its purposes. The flexibility and versatility leads to the application, rather than the direct development, of cutting edge science. A current example at the British Library is the use of multispectral imaging for the Codex Sinaiticus digitisation project, whereby a product developed for cancer diagnostics is assisting identification of scribal inks in the earliest manuscript of the New Testament, and hyperspectral imaging from fields such as astrophysics are being further investigated as part of this multi-national, virtual reunification project.

28. Another area where the British Library has taken an international leadership role is by convening the International Round-Table on Preservation Microfilm, set up to address the legacy problem posed by the large amounts of cellulose acetate microform to be found in many libraries and archives. The strategies for dealing with cellulose acetate, as presented at the international symposium in May are underpinned by years of scientific research at, for example, the Image Permanence Institute (IPI) in Rochester, NY.

⁷ The full report is at <http://www.bl.uk/about/collectioncare/pdf/webconservation.pdf>

THE DEVELOPMENT OF PRACTICAL APPLICATIONS FOR THE MARKET

29. In the British Library's experience, there is not a satisfactory process for developing practical applications of conservation research for the market. For example, a pH probe was developed with the University of Belfast as part of an investigative project in the 1990s, but for a variety of reasons (such as the cost of patents) this did not result in a marketable product. The BL's graft copolymerisation paper-strengthening project had a two year pilot phase with a commercial partner, but for a variety of practical reasons did not result in a marketable service.

30. Several EU-funded projects (eg LIDO (www.lido.fraunhofer.de), MASTER (www.nilu.no/master) have developed sensors for measuring the exposure of heritage objects to light, pollution etc, and have been brought to the point where the principle has been demonstrated, but there have been difficulties in commercialising them. The potential market is quite small and not well funded, so these products are not very attractive propositions to many commercial enterprises, however useful they might be to the sector. SMEs involved in collaborative research projects with heritage bodies naturally want to protect their intellectual property rights, and this may run counter to the interests of the other partners. In the library and archive sphere, two good examples from the US, would be the AD strip and the Time Weighted Preservation Index. The first one is a simple test for ascertaining the amount of "vinegar syndrome" in cellulose acetate film, which indicates how deteriorated the film is, which is particularly time-critical. The second is a very accessible way of predicting the impact of the environment on cellulose-based collections over time.

PUBLIC ENGAGEMENT

31. The vision for the new British Library Centre for Conservation (see Para 7) is to:

- create state of the art Book Conservation studios and Sound Archive preservation technical studios collocated for the first time together with the collections;
- incorporate public access such as behind-the-scenes-tours and educational opportunities as a fundamental part of the design;
- create training and educational facilities for conservation to replenish the profession of book conservation and for the interested public, including funded internships and the creation of a Foundation Degree in collaboration with a partner University;
- apply scientific research on materials to the conservation of library holdings.

As part of that vision, the translation of scientific research to interpret the collections is envisaged for example in the Conservation Visitor Centre and in the public programmes explaining the BL's collections.

USE OF INFORMATION TECHNOLOGY

32. In terms of the ways in which IT can contribute to enhancing access to, and public engagement with, objects of cultural importance without compromising their conservation, the BL sees digitisation as an important means to:

- increase and enhance use of its collections by providing electronic access both to readers who visit the Library and to remote users;
- assemble (or re-assemble) digitised materials that are held by different, sometimes geographically-remote institutions, into virtual collections that have a combined value greater than their component parts; and
- help maintain and prolong access in the future by providing digital surrogates for access.

33. The BL assesses proposals for digitisation projects in terms of:

- the likelihood of widening access to the collections;
- the likelihood of reducing handling of fragile originals;
- evidence of actual or potential demand;
- the development of a critical mass of material;
- the likelihood of sustainability;
- their contribution to the Library's strategy;
- the extent to which dispersed material will be virtually re-united;
- the extent to which cultural restitution issues may be addressed;

- maintaining an appropriate balance between public good and commercial resources;
- avoiding duplication with other digitisation programmes.

34. Two major digitisation projects are currently under way in the British Library, funded (£3.1 million) by JISC and focused on sound and newspapers. The first project will digitise up to 2 million pages from 19th-century British newspapers and the second nearly 4,000 hours of recordings from the Sound Archive, from oral history, field and location recordings of traditional and improvised music, rare or deleted classical and popular music recordings, soundscape and educational material.

35. In early November 2005, the BL and Microsoft announced a strategic partnership to digitise 25 million pages of content from the Library's collections in 2006–07, with a long-term commitment to digitise still more in the future. The British Library is the first major research library to partner with Microsoft on their digitisation initiative. The collaboration will digitise 100,000 out-of-copyright books and deliver search results for this content through the new MSN Book Search service. The BL plans to provide access to this material via its website. This will open up 21st Century access to the British Library's collections for research and for the citizen.

36. Other notable British Library digitisation initiatives include:

- Burney Newspapers—where just over 1 million pages of 18th Century newspapers have been digitised;
- Collect Britain—100,000 newspapers, maps, prints, sound recordings etc available at www.CollectBritain.com. Funded by £3 million grant from the New Opportunities Fund;
- International Dunhuang Project—which virtually re-assembles Buddhist scroll fragments from the Dunhuang area on the Silk Road which have been dispersed to institutions in London, St Petersburg, Paris, and Beijing.

37. *Turning the Pages* is an award-winning interactive programme that allows visitors to museums and libraries to interact with a virtual version of precious books and manuscripts while keeping the originals under suitable environmental display/storage conditions. Turning the Pages allows viewers to 'turn' the pages in a realistic way, using touchscreen technology and interactive animation. Originally developed by and for the British Library in 1998, it is now being marketed as a service for institutions and private collections around the world. Turning the Pages can be run on three platforms: Touchscreen, as installed in the Treasures of the British Library Gallery at St Pancras; on CD-ROM; and online. The BL's online gallery (<http://www.bl.uk/onlinegallery/ttp/ttpbooks.html>) currently displays fifteen items including the Lindisfarne Gospels and the Diamond Sutra. Recent additions to the online gallery include *Alice in Wonderland* (which received 60,000 visitors in the first five days of its availability) and Mozart's *Verzeichniüss aller meiner Werke* (which received over 27,000 visits on the day of its launch alone).

February 2006

Memorandum by The National Archives

The National Archives, UK is one of the largest archives worldwide and spans a 1000 years of British History from *The Domesday Book* to recently released government documents.

SUMMARY

- Conservation Science underpins the conservation of cultural heritage. It extends our understanding of heritage, can inform public policy, and enhance public value. The added value of conservation science to the understanding and sustainability of cultural heritage should be recognised by funding bodies.
- The National Archives is taking a leading role in applying science and technology to the preservation of the UK's written heritage. Our agenda is set within an institutional context, while delivering outcomes to a wider public audience;
- Conservation science in the UK is supported by a mixed economy. The national museums, libraries, and archives play a vital role in providing core conservation science research within institutional aims, supporting long-term research. More importantly core institutional funding provides a necessary mechanism to lever partnerships and resources from other big funding agencies;
- Funding for conservation science is fragmented and unevenly spread across the museums, library and archive sector;

- Resource sharing and collaborations amongst higher education, national and international partners is now common, although it is too often restricted by structural short-termism, and a lack of a dedicated funding stream for conservation science research from Research Councils.

RECOMMENDATIONS

- There is a need for a national strategy for conservation and science research. This should be supported by a co-ordinating secretariat and developed by a network of leading institutions based on common needs while recognising their diversity.
- This overarching framework would recognise that leading national institutions could take thematic responsibility, but set within a defined national research agenda. Funding would be needed to facilitate this.
- Funding for conservation science should reflect the enormous potential for science and technology to support the preservation of cultural heritage. Funding bodies should reflect the distinct value of conservation science research and a clearly defined and designated funding stream for conservation science research should support this.
- A mechanism and structure is needed to capture a range of data for reproducibility and re-use, with the aim of making the data more readily and widely available to be exploited by a wider community of researchers.
- Conservation and conservation science needs to be better recognised within the research assessment framework and encouraged to better exploit the opportunities between higher education and the museums, library and archive sectors.

1. WHO WE ARE

1.1 *Corporate Body*

The National Archives is an executive agency for DCA. It selects, preserves and makes available UK government records. It is one of the largest archives in the world and holds a range of records from *The Domesday Book* (1086) to copies of government websites. It leads the field in archival research in the UK.

PRESERVATION PROFILE AT THE NATIONAL ARCHIVES

1.2 The National Archives Department of Collection Care is charged with the stewardship of the UK's public records. Our mission is to preserve the nation's written heritage and to act as an exemplar of standard setting to government departments, as well as a wider professional and public arena. This is achieved with a total budget of £915,000 (2005–06) and 32 staff. Our current approach to the stewardship of The National Archives Collections is proactive, that is we are committed to identifying the risks to the collection and mitigating the deterioration of the records. We are also actively engaged in interventive conservation treatment to stabilise and make them accessible to a growing public audience.

1.3 *Electronic Preservation*

We have an extensive programme to develop systems to preserve and make available electronic records. We work in partnerships with other major institutions and the university sector to develop our own infrastructure, encourage market solutions and provide tools to enable a wider community to take advantage of our own preservation programme. A good example is our technological dependency registry which includes information on file formats and migration.⁸

2. CONSERVATION SCIENCE: UK'S WRITTEN HERITAGE

2.1 Conservation science is about understanding the materials and techniques used to create cultural heritage and to help manage change over time. It is by definition cross-disciplinary, and is a link between scientific theory with a cultural heritage application. Three main areas of conservation science are often defined as: technical examination, what artefacts are made of, when and how it was made; the study of changes over time, and about mitigating damage. Conservation science actively engages in technology transfer, adopting and

⁸ <http://www.nationalarchives.gov.uk/pronom>

adapting technology to our own goals, thus enabling movement away from often more costly interventive treatments to an approach of preventing or managing change.

2.2 Conservation science is sometimes described as an adaptive science, borrowing from other disciplines. However, as it moves to a more mature discipline its own science is emerging through the transference of existing science to new contexts, thus creating new science. Research undertaken by the National Trust on identifying the cementing properties of dust on cultural artefacts is an excellent example.

3. HOW IS CONSERVATION SCIENCE IN THE UK AND INTERNATIONALLY CO-ORDINATED BETWEEN MUSEUMS, UNIVERSITY AND OTHER ORGANISATIONS IN THE UK?

Conservation Science, written heritage: co-ordination in the UK

3.1 There has been little cross-sector co-ordination of conservation science research in the UK, although there is evidence this is now changing. The economies of cultural institutions are such that only the national institutions, mostly museums, can support scientific laboratories, and these sometimes have fewer than three scientists on staff and are charged in the first instance with supporting institutional aims. In recent years this capacity has been reduced and once available sharing of equipment and services has been eroded as organisations change emphasis to income generation rather than research.

3.2 The position of conservation science for the written cultural heritage, until the last five years, could be described as bleak, with little or no scientific support for conservation science research in either The National Archives or the British Library, nor were there dedicated facilities available in any other copyright libraries, or archives. Prior to 2000 both national institutions periodically supported discrete scientific research projects, although these primarily focused on further scrutiny of published data, or an evaluation of the efficacy of newly developed mass treatments, rather than defined conservation research projects. Without a designated science department in either The National Archives or British Library both institutions were reliant on the services of the UK's national museums.

3.3 In recognition of the need for greater scientific expertise to support decisions, the situation for the library and archive sector in the UK has changed markedly in the last five years. Both The National Archives, and the British Library have appointed Heads of Conservation Research. The National Archives has given further support with the appointment of a temporary assistant and the purchase of basic analytical equipment to enable thermal testing and FTIR-ATR. This is the only equipment or staff to support archive collection in the UK and these are the only permanent posts within the UK library and archives sector dedicated to full-time conservation science research.

3.4 Building on this achievement, The National Archives published its own research strategy (2004) focused on applied science that is finding solutions to practical problems. Our three year research strategy aims to predict the long-term stability of particularly vulnerable materials, and when possible to apply emerging technologies to develop less interventive techniques. The National Archives' conservation science research strategy is set within the context of a national research strategy agreed by the five copyright libraries, and the National Archives for Scotland in the Autumn 2004. This established for the first time, a co-ordinated applied conservation research strategy for libraries and archives within the UK.

4. COLLABORATIONS AND PARTNERSHIPS

4.1 To take forward our strategy, and in recognition of the expertise and facilities found in universities, The National Archives conservation science research projects will be collaborative and in partnership with the higher education sector and other lead bodies where appropriate. Since its establishment in 2004, our Conservation Research section is already leading a 3-year project, supported by The National Archives for Scotland and the Biophysics Department, Cardiff University. The Cardiff team will exploit nanotechnologies and use x-ray diffraction techniques to study historic parchments on a molecular level. We believe this study will help to answer some hitherto unanswered questions surrounding the materials science of parchment, and will provide the necessary evidence to revise current policies and practice.

4.2 While we acknowledge the huge benefits of shared expertise within the higher education sector, currently there are very real obstacles to seamless collaborations. Questions surround the appropriateness of universities to support scientific expertise when their expertise is varied and not cultural heritage. Often a university's research agenda is entirely toward pure science, necessary and vital to their meeting some academic requirements while the cultural heritage sector needs applied science to find practical solutions to problems; this is sometimes viewed as soft science.

4.3 Moreover, university departments now operate on a full-cost recovery bases making partnership funding directly for the written cultural heritage sector difficult, since institutional resources do not extend to meeting these full cost recovery requirements. In consequence some university departments view the relationship with cultural heritage institutions as cumbersome, given the low levels of resource available from in the heritage sector in comparison to opportunities presented by, say, industry.

5. EUROPEAN CO-ORDINATION

5.1 On a European level cross domain conservation science research is often integrated through central government. This is particularly true in the Netherlands, where Instituute Collectie Nederland (ICN) acts as a central laboratory for research. The Netherlands has taken the lead in setting in place an integrated national funding stream designed to match resources to need. A programme of central planning and resource allocation is also in place in Italy.

5.2 While there are many centres of excellence in the UK, and we are a leader in conservation science research in many areas, we have as yet a clear picture of the fundamental questions that need to be answered; it is unclear whether some of these questions are partially answered or the extent of commonality across disciplines.

6. IS CONSERVATION RESEARCH ADEQUATELY FUNDED, AND IS IT DIRECTED AT THE RIGHT AREAS? DOES THE UK HAVE THE CAPACITY AND SKILL BASE TO MAINTAIN ITS CULTURAL HERITAGE FOR FUTURE GENERATIONS?

6.1 Current funding for conservation science research in the UK is inadequate, fragmented and unevenly distributed:

- For the written heritage sector, core funding for 2005–06 is c. £180,000; an additional £700,000 has generously been given to the British Library on behalf of its library and archives partners for two major research projects. Funding for the written heritage is at present small in comparison to other sectors;
- The National Archives has made a long-term commitment to supporting conservation science research long-term, nevertheless current levels of support necessitate buying in services, and therefore forming partnerships and collaborations with universities and other lead partners is essential to taking forward our programme of research;
- Current research council funding regimes inhibit our ability to exploit this potential although our recently awarded academic analogues status is a welcome opportunity. Nevertheless, funding for conservation science for written heritage will be increasingly competitive given the disproportionately small levels of funding from Research Councils;
- Total spend by Research Councils on UK science research is currently < £ 3 billion per annum;
- Total value of research activity as reported from 35 national UK bodies secured from 2000–09 is c. £10 million;
- The total spend on UK conservation research for collection in 2005 is £1.1 million ie 0.36 per cent of the total budget;
- Reported Research Council funding for 2005 was £450,000, ie 0.15 per cent of the total Research Council budget;
- The total value of conservation science research secured for 2006 is estimated at £1.4 million.

6.2 Conservation science research is cost-effective and represents good value. Much of the work can be done by small teams. Evidence suggests that our current three-year funding cycle means that the majority of projects last only 32 months, and cost below £160,000.

6.3 EU funding for the fifth and sixth Framework enabled significant research projects to be taken forward. At present it would be impossible for The National Archives, as well as other national institutions to be a lead partner in an EU-funded project. The accounting bureaucracy and financial responsibility now required by lead partners makes this funding stream unavailable to most institutions. Given there were six UK co-ordinated projects under the fifth Framework Programme, that there were no projects co-ordinated by UK institutions for the sixth Framework Programme further supports this view.

7. SKILLS SHORTAGES

7.1 Two significant scoping studies (English Heritage, British Library) have identified skill shortages for the conservation sector. Recent HLF funding will support internships in the conservation sector, to provide some continuity in preserving lost skills, however this will not address the lack of engineering, chemistry and physics training so desperately needed by conservators.

7.2 Post-graduate conservation science training is only available through one post-graduate course in the UK; In the USA, for example there are post-graduate courses in conservation science at doctorate level.

7.3 It is anticipated there will be a very real skill shortage in conservation science research, as the core of conservation scientists will retire in the next ten years. We welcome the Select Committee's interest in this question, however we believe that the culture of short-term contracts, the reliance on the three-year academic tenure of graduate students, and low levels of pay provides little incentive for a long-term commitment to conservation science research.

8. HOW DOES THE UK COMPARE WITH OTHER COUNTRIES IN THE APPLICATION OF CUTTING-EDGE TECHNOLOGY TO MONITOR THE CONDITION OF OUR CULTURAL HERITAGE, AND TO ASSIST IN ITS CONSERVATION?

8.1 There has been a tremendous advance in technology that has enabled microinvasive or non-invasive approaches, scanning electron microscopy; portable versions of technology can provide analysis of artefacts until recently unavailable.

8.2 The UK is viewed as a leader in applying technology to the preservation of cultural heritage notable examples include:

- X-ray diffraction to the study of historic parchment (Framework IDAP Individual Damage Assessment of Parchment EU- 5th & 6th Framework) and Daresbury Synchrotron, UK;
- Solid Phase Micro-Extraction (SPME) used to measure volatile organic compounds
- Near Infrared technology: to identify brittle paper (*SurveNir* EU-Project 6th Framework);
- Laser technology: adapted and used as a cleaning technique;
- Chemiluminescence: device used to evaluate paper oxidation (Papyrus: EU 5th Framework).

8.3 These are just a few of the examples which demonstrate the potential application of other science to the preservation of cultural heritage. However, we can only adapt the technologies that are known, there are still difficulties in the translation of conservation science to practitioners since most scientists prefer to publish within their own field, writing in scientific journals that are not always picked up by conservators. There is a problem of identity of scientists working in non-scientific areas.

9. IS THERE A SATISFACTORY PROCESS TO DEVELOP PRACTICAL APPLICATIONS OF CONSERVATION RESEARCH FOR THE MARKET?

9.1 Evidence suggests there is not a satisfactory process to develop practical applications of conservation research for the market. For the library and archive sector several pilot projects have been undertaken in recent years, mostly for the development of "mass" treatment technologies, however these were deemed not to be marketable.

9.2 Conservation science research projects have developed various technologies for measuring light levels pollution and environmental control, however so far few have fully realised commercial markets. The sector is small and comparatively under funded which makes the costly patenting and marketing of some products unattractive to investors.

10. COULD BETTER USE BE MADE OF CONSERVATION SCIENCE TO IMPROVE PUBLIC UNDERSTANDING OF SCIENCE AND TECHNOLOGY, AND THE PART THEY PLAY IN OUR CULTURAL HERITAGE?

10.1 Conservation science has a fundamental role in supporting decision-making and the understanding of objects and the value of the collections. This key role is not communicated as well as it could be. By telling the story of how objects were made, used, the context in which they were created, conservation science can play a major role in contextualising cultural heritage and the hands and minds used to create it. Engagement of the public in science can add to their understanding of the value of culture. Notable examples of explaining cultural heritage can be seen in Liverpool National Museums' *Conservation Centre*; The National Gallery's *Art in the Making* series; and the British Museum's *Mummy: the Inside story*. Improving the public's

engagement with science could be more fully exploited and while at the same time provide significant public value.

10.2 The National Archives see enormous possibilities to engage the public in science and technology, and our vision is to explain how science and technology underpins the preservation of cultural heritage. The application of analytical testing to better understand the making and meaning of *The Domesday Book* are forthcoming. The results of the technical examination of several artists, represented in our collections will be featured on our website and through our education facilities. This project will be in collaboration with Tate Britain.

USE OF INFORMATION TECHNOLOGY

11. IN WHAT WAYS CAN IT CONTRIBUTE TO ENHANCING PUBLIC ENGAGEMENT WITH OTHER OBJECTS OF CULTURAL IMPORTANCE, WITHOUT COMPROMISING THEIR CONSERVATION?

11.1 It is our view that electronic technologies do offer opportunities, and that the cultural heritage sector has not exploited them fully. Conservation research at The National Archives will better exploit this potential by having the results of technical examination available on the web. There are many possibilities for the innovative use of technology to inspire and enhance public engagement with technology. However, these technologies are costly and require long-term sustainability not only short-term capital injections.

12. WHAT IN THE UK AND INTERNATIONALLY, ARE THE BEST EXAMPLES OF THE USE OF IT TO IMPROVE ACCESS?

12.1 The National Archives' website www.nationalarchives.gov.uk allows access to catalogues of our holding and those of local archives. It also has extensive education and learning materials.

Examination of Witnesses

Witnesses: MR NICK POOLE, Director, Museum Documentation Association; Ms HELEN SHENTON, Head of Collection Care, and DR CLIVE FIELD, Director of Scholarship and Collections, British Library; and Ms NANCY BELL, Head of Conservation Research, and DR DAVID THOMAS, Director of Government and Technology, The National Archives, examined.

Q192 Chairman: Can I welcome you all and thank you very much indeed for coming. We have seen some of you before but there are also some new faces for us. This is our fourth public hearing here so it is very nice to see you. Can I welcome members of the public who are also here and say that there is a short information sheet available about the sessions on the side over there. I do not know whether any of you would like to make an opening statement or whether we should just go straight into questions.

Dr Thomas: I think straight into questions.

Q193 Chairman: Then can I kick off by saying that we are very interested in the degree to which libraries and archives have moved towards the establishment of a strategic framework for conservation research and one that involves collaboration. This seemed to emerge from the conference that took place in 2002 between the British Library and The National Archives participating in a round table conference. Are we correct in this inference? If so, how did this round table initiative come about? What triggered the move away from the relatively narrow collection-based research in the individual institutions to this more broad-based collaborative strategy?

Ms Shenton: How it came about is that it was part of us looking at our whole strategy for the responsible stewardship of the BL collections. That was the starting point. We looked at how we should care for the collections from, at the one end of the spectrum we were looking in terms of how do we develop and modernise interventionist conservation through to the other end of the spectrum, which is preservation and preventive conservation. Underpinning all of that we thought that apart from training there was also a need to have applied conservation research that would help us to look after our collections and in our leadership role we saw applied research that was applicable to our collections would then be applicable to all library and archive collections. It was part of a whole joined-up strategy towards this responsible stewardship of our collections. So that led to various projects and reorganisations and as part of that we realised in terms of conservation research there was not a single person on the payroll of any library or archive in the UK specifically doing conservation research, so we created a post and The National Archives created the same a year later. We started to have a little bit of a critical mass. We catalysed the meeting that was funded by the Andrew W Mellon Foundation, the idea being that we did not want to work in isolation. We wanted to have a

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consensus as to what were the highest priorities for this applied conservation research to underpin caring for libraries and archives, so it chimed with what the Mellon Foundation were trying to do in the States for libraries and archives and had done for museums and galleries. They supported us and we invited UK, mainland European and US educationalists, directors of preservation and professors of chemistry to a brain-storming session. Out of that meeting came a consensus of three broad overarching themes for applied conservation research for libraries and archives and what we were after specifically was in the UK. We had a large focus on the other five copyright libraries and The National Archives within the UK because we felt that we would always end up with a distributed model and these were questions that were applicable, as I say, to all libraries and archives and therefore we did not want to work in isolation. Out of that came three overarching themes including life-cycle prediction, the storage environment, and the next stage after getting this whole UK-wide framework was that the British Library led on two proposals to the Andrew W Mellon Foundation working very collaboratively with the other copyright libraries and national archives, and just before Christmas we successfully were awarded just under \$700,000, which was the largest award for this sort of subject ever made. Those projects are just starting. One will look into identical books and how they have been stored in different environments, so this is working across the six copyright libraries and we will outsource or contract out the research, in this case to the UCL Centre for Sustainable Heritage. The second project starts next year, which is about volatile organic compounds, which is basically the smell old books give off, and how that is applicable to their storage environment. We are very interested at the British Library because we will have a new storage facility for 220 kilometres of stock. That is very, very pertinent to the particular issues we have but, equally, that is pertinent to any collection of libraries or archives.

Q194 Chairman: Thank you very much indeed. Would anybody like to add to that answer? Can I ask you a little bit about the role of the Museums, Libraries and Archives Council in developing this strategy. What is the MLA's role in supporting its continuing development? What is the day-to-day relationship between the MLA, which we understand is a DCMS non-departmental public body, and the British Library and National Archives and the MDA?

Dr Field: We work very closely with the MLA on a wide variety of matters to do obviously, with the museums, libraries and archives domains. We have

not actively worked with them specifically on the conservation research agenda, separate if you like from the broader stewardship agenda on which we obviously have many interactions with them. As far as I am aware, they do not have a particular policy in terms of conservation research which is divorced from their general role of providing an underpinning to the overall stewardship responsibilities of all of our organisations.

Chairman: Thank you. Lady Finlay?

Q195 Baroness Finlay of Llandaff: I would like to ask you about funding and the influence of that on research priorities. If I have understood it correctly, the British Library is funded through DCMS and The National Archives through the Department of Constitutional Affairs. How much are the departmental priorities influencing and reflected in the priorities given for conservation research?

Dr Thomas: Can I respond for The National Archives. We are not in fact talking about very much money at the moment. Our total expenditure on this area is just over £100,000.

Q196 Baroness Finlay of Llandaff: On conservation research?

Dr Thomas: Yes, and that is not the sort of level of funding that we would need to go to our parent department for. That is funding we can fund ourselves out of our ordinary voted money. We have a target in our corporate plan to do with research, including conservation research, which obviously DCA has seen and approved, but we are not talking about volumes of money where we would need to make a special case to the department.

Dr Field: In relation to the British Library, the funding situation is not dissimilar. The amount for conservation research was about £140,000 last year, but I think here again it is important to understand that conservation research does not exist in isolation. It is part of our overall stewardship agenda and we do work very actively with DCMS, in our case, on a whole raft of preservation and conservation issues, not least in terms of capital expenditure. So I think the expectation normally is that revenue expenditure would be met out of the grant-in-aid but there are two specific areas where the DCMS has contributed very substantially on the capital side. One is the storage programme to which Helen has already alluded, and that has a very substantial preservation driver to upgrade the quality of the environment for a lot of our storage. That is basically a £25 million development which is being supported through DCMS. The other is our new Centre for Conservation which we will be opening next spring, and again which has been supported by a very substantial capital injection from government.

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I think the expectation would be that the revenue activity around conservation research narrowly defined would be determined by the Board of the British Library.

Q197 Lord Chorley: Can I chip in to get a feel for it. £100,000 a year is about one person, is that right, fully costed? The figures £100,000 and £140,000 were mentioned, I think. Is it one or two people?

Ms Shenton: At the BL it is one person plus then where we have done research and staff time in support of projects such as Codex Sinaiticus.

Q198 Lord Chorley: Essentially it is one post we are talking about.

Ms Shenton: It is essentially one post.

Dr Thomas: We have two posts at National Archives.

Q199 Lord Chorley: One or two then.

Dr Thomas: It is not large numbers.

Ms Shenton: Again it is worth putting that in context because essentially we are working very much in a mixed economy, largely because we are not really in a position to develop huge laboratory facilities in our institutions and therefore we are working very much in partnership with the academic and research community, and of course also all our sister libraries, so the overall resource which is being levered potentially in library and archive development is larger than the narrow investment within our institutions.

Dr Thomas: I agree with that. I do not think we see ourselves as conducting a lot of research in-house. We see ourselves as intelligent customers and we want to buy research from the academic sector rather than do research in-house.

Q200 Baroness Finlay of Llandaff: Are you able to give us any idea of how much additional research then you are contracting in in addition to what sounds to me like three whole-time equivalents effectively, the people in-house.

Ms Bell: This is, as you can appreciate, early days for us but our aim in the last two years has been to define our research strategy, in addition we are providing partial support for two full-time PhD students at Cardiff University, in the biophysics group. We have funding proposals to submit for other projects and we are currently supervising a student on the RCA and V&A course. It is a question of identifying appropriate partnerships and developing those relationships. I would say that the university sector for us is absolutely central to having a healthy and long-term conservation science programme.

Q201 Baroness Finlay of Llandaff: Perhaps, Chairman, I should declare an interest at this point in that I am part of Cardiff University myself, in a different department but I think that needs to go on record given that Cardiff has come up rather nicely.

Ms Shenton: Can I reinforce Nancy's point that it is very, very early days for us. We have always seen, particularly in these early days, that there is a mixed economy and how do we get a critical mass in-house, but also we have set it up as this distributed model so that we would not set up a £1 million lab. There are lots of universities with the facilities and there could be student projects, but for us it is a question of how do we build up this balance between a critical mass with continuity in-house and then also balance that with project funding.

Q202 Baroness Hilton of Eggardon: I am not clear about the Museum Documentation Association and how you fit into this particular pattern. Do you do research as well or not?

Mr Poole: We are funded by the Museums, Libraries and Archives Council to provide information and support to museums on the documentation and information management in their collections, so in as much as a number of the questions so far have focused specifically on library and archive research we hold no remit there. We do not hold a remit for conservation research specifically in museums. Our role is that we are funded by the Museums, Libraries and Archives Council to establish an advisory service in a number of areas of conservation and management and we work in partnership with colleagues at the National Preservation Office within the British Library, with The National Archives, and others. Our remit specifically does not cover conservation research and the focus of our response to this inquiry is predominantly on the ICT side of things where we do hold a remit. Also in as much as we support these aims in this area, we work very closely with colleagues in the sectors.

Q203 Baroness Hilton of Eggardon: Presumably museums have archives?

Mr Poole: They do, yes.

Q204 Baroness Hilton of Eggardon: How do they fit into the overall pattern?

Mr Poole: I do not have the figures to hand but a significant amount of archives are in museums and also many museums hold libraries.

Q205 Chairman: Would you speak up a little and perhaps a little more slowly.

Mr Poole: A significant amount of archive holding is in museums and a large number of museums also hold collections like library collections. What we try

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and do is take the expertise that is generated within the library and archive sector by the British Library, The National Archives and others and share that with the museum community so the museums can benefit from the best practice that has been established elsewhere.

Q206 Baroness Hilton of Eggardon: But your materials do not count as part of the National Archives? Some of it must be archive material, must it not, that you hold?

Dr Thomas: Can I try and explain?

Q207 Baroness Hilton of Eggardon: Please.

Dr Thomas: The National Archives is responsible for the archives of the UK government and so because of the way that the legislation works some archives are public records and they constitute public records if they are records of publicly-funded UK government bodies. The British Museum's own archives count as the public record. They hold their own archives and administrative records, but the records relating to the collections are their own internal archives. We have an advisory role in respect of archives held in museums but we do not have the same statutory role as we do in relation to public records.

Q208 Chairman: Can I clarify your relationship with the MLA. Am I right in thinking that the MLA as a DCMS-funded body links up in this respect to the British Library and MDA? You are funded by the MLA, but what is the relationship between National Archives and the MLA?

Dr Thomas: We just have a collaborative relationship with them.

Q209 Chairman: A friendly relationship?

Dr Thomas: Yes, a friendly relationship.

Q210 Lord Chorley: This is really addressed to National Archives. In your helpful evidence you start by a series of recommendations and it is the first one that we would like to talk about where you identify "a need for a national strategy for conservation and science research". I think there are a couple of questions and I will do them consecutively. Is this proposed for the whole of the cultural heritage sector, in other words moveable and immovable? That is the first point. Let us stop there and then go on to the second point.

Ms Bell: Following on from Helen's point earlier on, there was a published report sponsored by the Mellon Foundation two years ago which set out a five-year strategy and that strategy was endorsed by the other copyright libraries and the National Archives for Scotland, and therefore there is a strategy for

libraries and archives which is part of moveable heritage.

Q211 Lord Chorley: There is?

Ms Bell: There is for the next five years.

Q212 Lord Chorley: Just the moveable, but not the immovable?

Ms Bell: There are other published strategies for the immovable heritage.

Q213 Lord Chorley: The buildings as far as you are concerned are quite separate, putting it in crude terms?

Ms Bell: Yes, but The National Archives would champion an overall strategy for both the moveable and immovable heritage.

Q214 Lord Chorley: I think that probably deals with the first part then. Does any one body have the lead role in pushing this initiative?

Ms Bell: At the moment it is very much being taken forward by both the British Library and The National Archives because we have a national responsibility. I think a large part of what we are doing is ultimately to translate the results of conservation science research into a wider community, but as there is no one dedicated funding stream at the moment for conservation science research, it would be somewhat difficult to say who should be taking a lead.

Q215 Lord Chorley: I am slightly going to and fro. English Heritage is not really in your conversations as of now?

Ms Bell: Not formally but certainly we are well aware of their focus of research.

Q216 Lord Chorley: It is in your mind?

Ms Bell: We are well aware of the research that they are doing and we would always complement not duplicate their work.

Lord Chorley: I think that more or less covers it.

Q217 Chairman: Can I then just clarify, when you talk about the moveable heritage, you are talking effectively here about libraries and archives as part of the moveable heritage and not objects and so forth?

Ms Bell: We see it in terms of moving the national agenda forward. Clearly we are, as you quite rightly point out, looking at quite a discrete part of the agenda in libraries and archives. There are essentially a number of sets of players and clearly those of us represented here who are custodians of the national heritage have a major responsibility and interest in moving that forward. We have already alluded to the interests and responsibilities of government as a

second player in that. We have identified that we do see the future as working collaboratively with academic research, and therefore our partners in the universities. Of course, in terms of funding the developing relationship is very clearly with the relevant research councils, not least the AHRC and EPSRC, and we look forward very much to essentially developing the research agenda which covers all of that and involves all of those parties.

Q218 Baroness Hilton of Eggardon: To pursue this question of the strategy, you were talking about dedicated funding streams and to those of you who argued for that in your written evidence, how would you see that being administered? Is there a danger of having too much centralised control if such a funding stream is established and that objectives might be set by bodies outside your own responsibilities? How would you see it being administered and how would it be set?

Dr Field: I think what we are all saying is that these are very early days and clearly we are using the resources which we can access to try and move the agenda forward. To develop a sustainable national framework we do need some ring-fenced money for a period of time. I do not think we are particularly arguing for ring-fenced funding forever because obviously in the true spirit of the way in which research councils operate, good research proposals submitted in responsive mode will be funded, but for the moment in order to define truly what the national research agenda is—and we have already alluded to some of the funding work we have done in museums and archives—and to do that systematically across the piece, to get agreement in terms of what the national priorities are and essentially to get that programme started, we believe that we do need a source of ring-fenced funding. As I have indicated, we do look particularly to the AHRC and EPSRC to work collaboratively. We do not see that there is a tension there between the roles of each of those funding councils. All of the funding councils work in a very cross-disciplinary way and we see very much a programme being established there through the research councils who would then broker the kind of partnerships which we would need between the custodians and providers on the one hand and the researchers with the facilities on the other, with bodies like the MLA and the government exerting a moderating influence. We hope there will be a shared agenda which will actually come out of that.

Dr Thomas: There is a very good model in the field of research into digital preservation where in the higher education sector JISC, which is the funding body, has worked very collaboratively with different research organisations and holders of digital archives and digital books and has come up with a series of

research proposals which has pushed the boundaries in this area very much. It is being done in a very collaborative way and a very consultative way and we think it has been very successful.

Ms Shenton: I think one of the characteristics of this whole field is that it tends to fall between the two disciplines of arts and science, and I think that is where the AHRC and EPSRC would have to be working together. I would reinforce what David says in terms of JISC. When we quoted you figures, those were for our conservation research agenda and we have been the recipient and beneficiary of projects for e-preservation research as well, which we can go into when that is appropriate.

Q219 Baroness Hilton of Eggardon: You have managed to attract some private funding from the Mellon Foundation. How do you set about doing that? Do you have a fundraiser or is it *ad hoc*? How does it happen?

Ms Shenton: At the British Library we have a Development Office which helped, for example, with the funding for the Centre for Conservation and helps fundraise for significant heritage applications. We have a strategic partnership with the Mellon Foundation. We have worked with them over the years. They have, for example, supported the digitisation of the International Dunhuang Project. They were scrolls that were found in the Dunhuang Caves on the Silk Road and they are in Beijing, they are in Paris, they are in Russia, and they are at the British Library. It is the virtual reunification by digitisation of these ninth and tenth century scrolls. It is a phenomenal project. We have worked with the Mellon Foundation over the years and they have supported that to the tune of some £3 million. They like to have a long-term strategic partnership with the bodies that they fund. The conservation research we had in mind chimed with what they were thinking of and what they have done in the States in museums and galleries (not in libraries and archives) which is to have this strategic framework in conservation research in the US, out of which comes fellowships or posts, for example at the Chicago Institute of Arts.

Dr Field: I think what particularly interested them in the libraries and archives was that they were not just funding developments in the UK but they were genuinely moving forward international agendas, so I think this is an area where the UK has developed quite a leading role.

Ms Shenton: In fact, the Library of Congress are looking at what we are doing with enormous interest.

Q220 Chairman: You will be pleased to know that when the AHRC came to give evidence to us they did set themselves up as the champion in this area, so perhaps we can look forward to seeing some

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collaborative projects (although as you say it is early days) with the EPSRC and ring-fencing of funding to allow such projects to get underway. What I would like to do now is turn to the European Union and specifically to the Sixth EC Framework Programme and the impact that the decline in funding for heritage research in the Sixth Framework Programme has had on the libraries and archives sector. What hope do you have for any change in mood on the part of the European Community? Are we likely to see with the Seventh Framework Programme any change of heart?

Ms Bell: I would think that firstly the reduction between the Fifth and Sixth Framework from something like £28 million in the Fifth to £7 million in the Sixth is a significant loss in revenue and obviously reduces the number of projects in which we could participate. It also increases competition and brings with it a certain level of frustration for those preparing bids. I think one of the huge advantages of EU funding I have observed over the years is that it develops long-term partnerships. We would not be able to do some of the work we are doing now if we had not been very much junior partners in one project, say, in Denmark. As a result of that we will have a long-term relationship with partners there. So not only is the reduction of funding having an impact on library and archive projects because we will just have fewer results, but intellectually it diminishes our potential for the future and diminishes creative partnership in the long term between EU counterparts, so it is a huge loss on two levels, I believe.

Ms Shenton: I think I would agree with Nancy on that. We are junior partners with some projects within the Sixth Framework—PaperTreat and SurvNIR. I would make two other points. One is that the huge bureaucratic overheads of EU projects are a disincentive for us to lead on any project. Having said that, we are also extremely grateful recipients of a grant of about €8.6 million in the digital arena for a project called PLANETS, which is the Preservation and Long Term Access through NETworked Services. We are leading on this and there are 15 other organisations, including national libraries but also Microsoft, because particularly in the digital arena the issues of digital preservation are so huge that absolutely everyone sees that it must be collaborative. It is looking for the tools for high level automation of looking after digital collections. So that is where in the Sixth Framework we have been successful, but I think the overheads are not to be ignored.

Q221 Chairman: If I can clarify just on the overheads issue, this is that they only provide 20 per cent for administrative costs?

Dr Field: I think Ms Shenton meant the general administrative burden as opposed to technical issues to do with the financial overheads.

Q222 Chairman: You are required to put in the initial proposal and then the negotiations in the proposal?

Dr Field: And the management of large-scale proposals as well; it is not easy across continents.

Ms Shenton: Also there is the lead institution and all the other institutions are then subcontractors so you can imagine—

Q223 Chairman: You are the lead institution on this project?

Dr Field: We are for PLANETS.

Chairman: I can understand that because at a smaller level I have also led research projects funded by the European Union.

Lord Chorley: There is a touch of heartfelness about it!

Q224 Baroness Finlay of Llandaff: The British Library's Conservation Research Strategy, in 2004, identified a fundamental principle that conservation research had "to contribute directly to the long-term preservation of the physical collections". Could you explain to us how this principle is applied in practice and particularly in the context of the broad-based collaborative approach to conservation research and indeed some of the collaborations that you have already outlined for us this morning?

Ms Shenton: I would mention again the UK framework which was a consensus in an international context in that we had Harvard University Library and the Canadian Conservation Institute and these other organisations, we did come up with these overarching themes. Within those three themes, the projects that we are developing and have now got funded are applicable to all libraries and archives. The one I mentioned a second ago about the volatile organic compounds will be applicable to any macro environment of storage of large volumes of books.

Dr Field: Within the context of the British Library again—and clearly we are focusing on conservation research here—we see that as part of a broader stewardship agenda. It is very much part of our preservation and conservation agenda and that fits into the holistic management of our overall collection responsibilities, so any particular activity is supporting the whole spectrum of what we do. There is a very great danger of this sort of activity becoming intellectually interesting or a professionally interesting piece at the side of our operations, but partly through our management and funding structures we ensure that any activity here is really mainstream and can benefit across the piece. As

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Helen has said, it goes through what we do and through our leadership role in bodies like the National Preservation Office in terms of traditional preservation activity or our membership of things like the Digital Preservation Coalition in terms of digital activity where we can then spread and cascade the good practice which we hope we have been able to develop.

Q225 Lord Chorley: One of the interesting bits of evidence, starting off on The National Archives evidence, is that you identify the difficulties in collaboration with universities where there the university research agendas tend to be directed “entirely towards pure science” rather than “soft” applied science. How serious is this and what is being done about it? What can you do about it?

Ms Bell: Well, I should begin by saying again these are very early days and any collaboration and any relationship takes time to develop and nurture. Using the Cardiff example, with the bio-physics department there, I am very pleased that it is a department which actively is interested in engaging with the heritage community and has already, before we established this partnership, established a research post with the National Archives for Scotland. They therefore have a history of working with in the heritage sector. When I suggested in written evidence that there were obstacles between pure science and soft science, I did not want to leave the impression that it was an either/or, but to say at this stage in our development in conservation science we are very much looking at resolving specific problems or informing specific applied research problems. This Committee has heard extensively, I am sure, of the context in which university departments operate three-year funding cycles and the need for high-level research outputs as measured by research citation indexes. Sometimes the questions that we are seeking to answer do not necessarily yield the publications that will give them the highest research ratings. I see this as an obstacle but not one that cannot be overcome because it is all in how you package things.

Q226 Lord Chorley: Right at the beginning of your answer you said something like this: it is early days yet.

Ms Bell: It is early days for The National Archives and national science conservation research.

Q227 Lord Chorley: I see. It is early days in having a relationship with universities at all?

Ms Bell: That is right.

Q228 Lord Chorley: I see. I think that probably deals with the first half but there are other related questions. You refer to the fact that the universities

generally operate on a full cost recovery basis. In effect you have alluded to that. I think we have more or less covered it.

Ms Shenton: Just thinking about some examples of this pure science and soft applied science. One of the projects we have had at the British Library before we became more integrated and joined up was working with University College London’s Department of Chemistry using the Raman-laser spectroscopy. That has helped us, for example, look at what is the blue pigment on particular manuscripts; is it lapis lazuli or is it ultramarine? That is the sort of relationship where techniques we applied to the questions that we have about specific items in our collections. At the Mellon meeting one of the professors of chemistry called it the “romance of the collections”. We had these curatorial questions and also conservation questions about these particular manuscripts and we worked with University College London’s Chemistry Department in doing some analysis.

Dr Field: A more recent example would be some work we are currently doing in a very exciting digital project around the Codex Sinaiticus where there is a very, very strong conservation research agenda but it is actually embedded within what is fundamentally an academic project. What we are actually getting is essentially teams of researchers in the UK and Germany in particular engaging with the conservation team to see how the conservation team’s work can start informing how the academic agendas work.

Q229 Lord Chorley: Do you identify the same sorts of problem that The National Archives have been identifying of the way universities do their research within their departmental research agendas, ie, the difference between “hard” science and “soft” science?”

Dr Field: I think that is perhaps a slightly stark contrast. I think the point which both of us have made is that our conservation people are obviously on the bench and on the whole are not reading the latest scientific journals whereas the researchers in the universities are obviously engaged in research and are not necessarily as familiar as we would be with what is happening on the bench, and what we are trying to do is to bridge both sides. I do not think it is a question of criticising the universities for doing their business in one way or us on the other side doing our business in another way.

Q230 Lord Chorley: I was not being critical. How big a problem is it for you? I get the impression that in neither case is it a huge problem. It is the sort of thing you have to live with.

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Ms Bell: I think it depends on the nature of the research that you are commissioning. If you are commissioning PhD or post-doctoral research, that will have a certain context with it. In other words, students need to get their PhDs and they want to produce the most cutting edge research that they can. This sometimes does not necessarily lend itself to answering applied research questions. That does not mean within that one cannot get the answer to the question. TNA at the moment is sponsoring PhD work and we will be looking for, say, dedicated funding for one-year projects based on industrial models of research so that we can get specific bits of research done within one year. So I think the difference between applied and pure research is not a problem as such; it is the stream in which the research is undertaken, whether it is graduate, post-doctoral level, one-year projects. It is all manageable. It is building the relationship over a long period of time and translating the results of that work into practical applications.

Q231 Baroness Hilton of Eggardon: If we could pursue that in relation to museums. We were at the National Gallery where their scientists were busy analysing paint samples and biological materials and all sorts of thing which I would have thought were very relevant to things you might wish to do from time to time. Do you have any contact at all with them? They are mostly chemists.

Ms Bell: Professionally we have routine contact with all the conservation scientists, particularly in the national institutions, and we certainly would use and exploit their expertise and equipment where possible for specific projects.

Q232 Baroness Hilton of Eggardon: Have you actually done so?

Ms Bell: We are hoping to do some work with the Tate and RCA and V&A through Imperial where we are using their equipment and kit.

Ms Shenton: I think there is a very healthy professional network between the conservation science departments. An example where we looked to the National Gallery is the Codex Sinaiticus project that Clive just mentioned. We want to examine the ink of the earliest New Testament in the world and we also want to look at the parchment on which the manuscript is written. We did a whole market analysis of how we could look at the ink, bearing in mind that we wanted a product that was available. There is a superb project at the National Gallery, the VASARI project which has this type of spectrum imaging. I think it is an EU project, forgive me I am not quite on top of the detail of that, but because it was not available off the shelf we did not go that route. What we have done is we have bought a

hyperspectral imaging system that is available from the University of Crete. It is very useable so that all our conservators can use it. It has been adapted from cancer diagnostics. That summarises what we are trying to do in terms of the stewardship of our collections, the interpretation of our collections, the analysis of our collections which is to borrow from other sectors—often medical sectors—techniques that are then adapted to our sector.

Chairman: I find the whole area very fascinating and interesting.

Q233 Baroness Hilton of Eggardon: I think both of you have appointed Heads of Conservation Research recently and I wonder where they fit into your hierarchy and the extent to which they can be influential in your decision making

Dr Thomas: I can answer for the National Archives. At the moment Nancy is Head of Conservation Research and she reports to the Head of Conservation and Collection Care, who reports to the director level. There is no conservation research representation as such on the board at the moment. We are planning to upgrade the Head of Research post to look at the whole research area with which we are dealing, including conservation research but also including research into user behaviour and research into how we deliver digital copies of records across the web. That post will become more senior and consequentially more influential. I think Nancy could say how much influence she has.

Q234 Baroness Hilton of Eggardon: To whom do you report?

Ms Bell: I report to the Head of Collection Care.

Q235 Baroness Hilton of Eggardon: Who is a board member?

Ms Bell: No.

Q236 Baroness Hilton of Eggardon: How far down the hierarchy are you?

Ms Bell: Third, but I would also add that the work that we are doing is important in that it is not just a question of researching aspects of material science—we hope will inform decisions at all levels. There is a very good relationship between the board and conservation research in looking at larger questions and evidence-based decision-making and how we as a team in conservation can provide the evidence necessary to answer some of the large questions of stewardship facing TNA collections.

Dr Thomas: I think that is very important. The problem facing us is not that we have got a lot of documents where we need to know very detailed questions about how they are written; it is we have a huge volume of material, over 100 miles of records,

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10 million items on our catalogue. We have got to take a risk-based approach to this and decide which are the most vulnerable parts of our collections and put resources into fixing those and storing those better. This is really how we see Nancy's role—advising on the big questions about what are the vulnerable bits of our collection, how we can care for those better, where we should be putting our resources and changing our storage to deal with those better. I think that is the way that conservation research will have an influence now and in the future.

Dr Field: The structure of the British Library is similar. We have conservation research reporting to the Head of Collection Care, Helen, and she in turn reporting to me as Director of Collections. I am there at all meetings of the board and over the last few years we have taken to the board a whole series of papers on particular aspects of the stewardship of collections, which have dealt with preservation, conservation and also with conservation research. We regularly report significant developments to them, particularly things like the good news around Mellon grants and so on and particular projects like the Codex Sinaiticus, so we are always trying to engage our board with the overall long-term stewardship responsibilities for collections, which includes as part of that spectrum of activity conservation research.

Chairman: I think now we would like to move on to information technology and issues arising from that.

Q237 Baroness Finlay of Llandaff: You have already spoken about digitised records a little bit but we have had concerns expressed about the long-term preservation in accessible format of digitised records of all sorts. It would be helpful to us if you could clarify what steps are being taken to resolve these concerns, if in fact you feel they are valid concerns, and the role that you have had to play in such a process—and, indeed, in such a process how the quality and longevity of any provision is being considered?

Dr Field: If I can perhaps talk a little bit about the British Library's approach, obviously we are looking effectively at two sorts of digital materials: there are those which are born digital—they have no direct paper based equivalent—and then there are digitised materials which we create through digitisation of materials which exist in an analogue environment and which will continue to remain there. Obviously, in terms of digital asset management, they are both digital assets but in one case, of course, we still have the original materials to fall back on and in the other we do not. We have a very sustained programme of investment in the British Library in the development of a digital asset management system. We started

about two years ago on that and it is a very large-scale, in-house development reflecting the enormity, obviously, of our collections and the scale of intake, not least of course in anticipation, for us, of the implementation of electronic legal deposit in the UK which we secured in 2003. So we are really making significant investments, in seven figures every year, in the development of that sort of modular based infrastructure. At the moment we have built a storage layer and we are currently out to procurement in terms of the ingest layer, and there will be various other modules in terms of that, such as resource discovery, long-term preservation and so on. So it is a very significant development. It is also one which we are doing in a collaborative way: both collaborative in the sense of involving other partners—and Helen has already referred, obviously, to the PLANETs consortium which is bringing a lot of research into that—but we are also working with industry partners, such as Microsoft. We are, also, working with other libraries so the infrastructure which we build will actually provide a service for access to a lot of that material to be received under legal deposit. So we take this very, very seriously indeed, not least I think in the face of a world where information is only being produced in these formats. One of the particular things we are actually leading on, of which the National Archives is a member, is a body called the UK Web Archiving Consortium, which is set out, essentially, to try and archive selectively just the UK bit of the internet—i.e. an information resource which has no equivalent in any other format. Unless we actually take that on, that information will be lost for good and the research on which future generations will be able to depend will, essentially, stop towards the end of the 20th Century. That is a very significant activity for us.

Dr Thomas: Can I say a little about what is happening at the National Archives? We have a programme called Seamless Flow which is about how we handle digital records created in government and how we select them (because you have to select them in a different way from paper records), how we transfer them to the archives, how we store them, how we preserve them, how we search them and how we make them available. That has been done in a modular way. We have built a digital store, we have got transfer procedures in place and we are building a transfer mechanism; we have got a first phase delivery and search mechanism in place and we hope, by the end of the next financial year, to have the whole system in place. However, I think that is only half the problem. The other half of the problem is that because we take electronic records from government departments, what happens to the electronic records between the time they fall out of use in the departments and the time they come to us, and that

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is when they are really at their most vulnerable. So we are looking at the possibility of a collaborative project with government departments to see whether we cannot come up with some scheme for some sort of intermediate store which will take electronic records which are not used heavily for current business but which have still got some current business use and which will be preserved there until they are either destroyed or transferred to the Archives. We are investigating that at the moment. Clearly, there is a lot of material in government which has no long-term archival value but which has very long-term business value—for example, records relating to nuclear waste. We hope to do a project in the space of the next year or so on that.

Ms Shenton: From a stewardship point of view it is probably the most urgent issue (whether it is necessarily the most important issue is open for debate) because there is the potential for total loss. That is the key difference. Also, that you have to intervene. You cannot leave a floppy disk alone because in time you may not have the hardware or the software and so on to play it, but there is this potential for total loss. Therefore, on the practical front, we at the British Library and the National Archive, were amongst the founder organisations of the Digital Preservation Coalition and the British Library's Chief Executive was the first chair. We have now set up the first cross-directorate digital preservation team within the BL because this is not classic conservation, if you like. So we are working with e-strategy colleagues across the organisation and we also have a number of projects—for example, under JISC, for life cycle collection management of digital material, we work internationally with, for example, PREMIS, which is the meta data standards. What that means is getting it right at the beginning of the life cycle of the material to prevent total loss, not a long way down the street, but even in the short term.

Dr Field: We are building on that in terms of relationships with publishers because we very much have to start influencing digital materials at the point of their birth rather than simply taking them in to worry about how we can deal with a problem there. We have had some very successful engagements in anticipation of essential implementation regulations for electronic legal deposit, for example working with something like two dozen academic journal publishers who are now voluntarily depositing with the British Library academic journals and we are beginning to tease out where some of the standards issues are so that we can actually get a genuine work flow so that the risk to this digital material, as it goes through its life cycle, can be minimised by proper management by all parties.

Dr Thomas: I think, paradoxically, the issues surrounding preservation of digital material are better understood than issues surrounding some of

the more esoteric, physical materials. We know what has to be done to ensure the survival of digital materials; there has been a huge amount of research in this field and we are now able to build systems. The issues are all around management and how you manage digital arrangements; it is not about the technology.

Q238 *Chairman:* Mr Poole, do you have any views on this issue?

Mr Poole: I do, thank you, my Lord Chairman. Museums, in some respects, are less well advanced in this area. The main strand of digitisation, working within the museums community, we are now talking not so much about national museums which are funding and undertaking digitisation activity in their own right but the digitisation of the wider, cultural heritage that is held in smaller institutions. The majority of that digitisation work was funded through Lottery investment from the New Opportunities Fund, now the Big Lottery Fund, and one of the requirements of that funding stream was that museums should establish preservation strategies that should talk about the long-term care and preservation of the digitised resources. Our role, in as much as we provide advice and support to museums, is to learn the lessons, I think, that we have heard about from colleagues in the library and the archive community and to embed within the wider museum community the same kinds of ideas around preservation strategies and around management. As we have heard, the technologies are more or less stable; it is really bringing into the museums world the sense of professional process to ensure that their digitised resources remain available.

Q239 *Baroness Hilton of Eggardon:* To pursue that point with you, Mr Poole, to what extent do you encourage museums to use the same systems as the National Archives or do they have their own particular systems?

Mr Poole: Systems is a difficult content in this context. What we try and do is look at the environment in which museums are digitising and the ways in which they digitise—the work flow of actually creating digital surrogates of physical objects—and see where there are existing professional standards which exist and encourage museums to adopt those standards. The majority, I would argue, of museum digitisation is undertaken on an outsourced and contracted-out basis. So from our point of view it is a question of giving museums sufficient information to be intelligent in applying for outsourced digitisation.

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Q240 Baroness Hilton of Eggardon: How successful are you in getting them to adopt the ones suggested by the National Archives as more appropriate, or are they all pursuing different computers, different providers and different expert outsiders?

Mr Poole: I would argue reasonably successfully. It is much easier where there is a single source of concerted funding for investment in digitisation work to stipulate standards, and the standards that drove most of the Lottery funded digitisation work were derived from those in the academic and library archive communities. Where digitisation work is being undertaken by individual organisations for their own purposes, what we exist to do as an organisation is to provide them with information resources, and I see it as our role to mediate between the technical standards and those institutions that want to apply them. Our principle is to encourage people to adopt the new standards even if they do not necessarily know what they are but that the information that they are basing their systems and processes on represent best practice, which in itself is derived from existing standards.

Q241 Baroness Hilton of Eggardon: Suppose people wanted to access information on a general basis. Would they be able to, or would they have to look at each individual museum website or what-have-you?

Mr Poole: There is a lot of work going on to bring together digitised resources. I think one of the important concepts in the museums world is that of the distributed national collection, which is the sense that objects from different museums, different contexts, can be brought together to create collections around themes and ideas. Obviously, it is much easier to bring those things together digitally than it is to bring them together physically. A lot of work has gone into creating what is known as meta data, the management of information about digitised resources, which means that they can be identified and disclosed and brought together. So there has been a lot of work. I will not argue that this isn't still relatively early days, and certainly for museums very early days, but what we are trying to do is embed the kinds of information that we need in order to be able to pull together the digitised resources in those ways.

Q242 Chairman: Can I ask what the relationship is between the National Archives and the MDA? As I understand it, the National Archives have responsibility for setting national standards for electronic record management. How does this link up with the MDA?

Mr Poole: We have, I think it is, another friendly relationship. We have not had a formal relationship up until this point. My organisation has recently been given a mandate by the Museums, Libraries and

Archives Council to create a national advisory service for museums, libraries and archives, and what that involves is bringing together a network of organisations, including the National Archives, the National Preservation Office and others, to amass professional expertise and consensus around best practice into one place. So we are in the process of formalising our relationship with the National Archives inasmuch as they provide an advisory service, and it is very much our intention that we should encourage museums to benefit from the expertise that the National Archives can make available through this service.

Q243 Lord Chorley: How effectively do the major libraries and archives use IT to enhance access to books and records without impacting on their long-term preservation?

Dr Thomas: If you look at the newspapers today you will see that the 1841 Census, which is one of our holdings, has just been released online. We have got an extensive programme of providing digital access to two categories of records, really: to very popular records such as Census records and wills which are used primarily by family historians but, also, increasingly, we are looking for sources of funds to digitise records which are of use to the academic community. Until recently we have been able to fund some of this digitisation work in-house but because of our funding situation we are now increasingly having to rely on third parties, either the private sector or academic funding bodies, to fund this digitisation work. We have been pretty successful: all the Censuses from 1841 to 1901 are now available online, for example; all our collection of wills is now available online and many other records. Until recently most of the stuff we have digitised, fortunately, has been already microfilmed (it is just a question of running the film through a machine to produce digital images), but now we are moving into a situation where we will be digitising original manuscripts. Some of those will be done by private sector contractors, and we have developed a set of standards for use by those contractors to ensure that the documents are not damaged during the digitisation process. We do enforce those standards pretty rigorously; we are quite tough about inspections and ensuring that when private sector organisations digitise our material they do it according to our approved standards. However, the pattern is very much moving towards the use of either the private sector or academic funding bodies to pay for digitisation.

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Q244 Lord Chorley: Is the digitising process straightforward? How great are the risks? Are there lots of cowboy contractors? Of course you do not employ them, but how do you ensure quality control?

Dr Thomas: We talk to contractors; we look at their financial position; we also go and visit their premises and we have written standards which we have to make sure they conform to. So we think there are some high-quality people in the industry now and it is a growing and developing area of work. We are reasonably confident that it can be done in a safe way.

Dr Field: I think the position of the British Library is very similar. We have long had a surrogacy programme, which, of course, traditionally, has been around microform but is increasingly now around digitisation because of the additional access advantage which it gives. A lot of that basic work is actually outsourced. We have had contracts for a number of years for which standards are very, very clearly specified, they have existed for a long time since the microform age and they exist now as well and, again, I would echo the comments which David has said about JISC in getting those. So, certainly if you see an ITT from the British Library you will find that the number of hoops contractors actually have to jump through is pretty frightening. We have done some very large-scale projects, two of which are being funded in two very different areas, sound digitisation and newspaper digitisation, which are very, very clear examples of that. We will not let contractors proceed to production unless they meet our quality assurance criteria.

Q245 Lord Chorley: I do not know how the whole thing is done at all. What is the nature of the damage that might be done and the sort of problems that you have to really guard against?

Dr Thomas: There are two things, really. First of all, if stuff goes off-site, clearly, there is a security issue. You do not want somebody breaking into their premises and stealing one of your Census books, or whatever. Also, there is the physical handling risk: because you are taking these things and you are putting them on a scanner there are some physical risks in actually handling the material. It is easy to exaggerate because if you digitise stuff it means that physically it does not have to be handled again by the public; they can see it online. So for a small risk and one handling you are getting many thousands of viewings online with no risk.

Q246 Lord Chorley: Of course, as one knows with photography, the scanning is superb.

Dr Thomas: Absolutely.

Dr Field: Within the British Library, part of our assessment for any new digitisation programme is a conservation assessment, so that we look at whether

the physical condition of the material will actually sustain being handled, and then, very much like David, you can go and check out not simply the equipment that is going to be used but the operators who are actually going to use it and test they are capable of actually using it in the way it is designed to be used. So there is a considerable amount of due diligence. We have just done this, in fact, in terms of a very considerable amount of 18th Century Parliamentary materials, it happens, which we are lending off-site, to be included in a national programme of digitisation, which was very, very tight in terms of contractual arrangements we had to do for that and the physical inspections which are actually undertaken by our staff and so on.

Q247 Chairman: How much of this is available online to the general public or is it largely through subscription services?

Dr Field: It is a very messy picture and a mixed economy at the moment. It is certainly something which was covered in one of the National Audit Office reports a couple of years ago on the British Library that commented favourably on what the British Library had been doing in terms of digitisation and, I think, the important point, the lack of a national framework for what was being digitised and how it was being made available. Again, I think we are working collaboratively with bodies such as JISC, which is trying to get a new content policy together for the use of the public sector parts of the UK. It is very piecemeal. We, at the moment, for example, are leading on a historic UK digital newspapers project; we are currently coming up to another one of these phenomenally arduous ITTs in terms of looking for a vendor who is actually going to be able to deliver this holistically, and part of that is to deliver the outcome of all the digital newspapers which we have created within the British Library, howsoever funded, in a consistent way that will be free at appointed venues within higher education, further education, public libraries, and so on. However, this thing costs a lot of money and, very much like David, you therefore cannot exclude that some material may be available—perhaps it may be around value added—on a subscription basis. So it is very much on a scale—you can imagine for the British Library with 150 million collection items—where the investment to do this as well as keep up with all the new material which is only being created digitally is enormous. I think we would be the first to concede that more needs to be done in the UK in terms of providing access to this in a holistic and seamless manner.

Dr Thomas: I agree it is a very confusing and messy situation, but we have to get the funding from where we can. Where the commercial sector is involved then

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there is inevitably a charge. In terms of government records which are born or created digitally and do not exist in a paper form, then we provide those free of charge as part of our ordinary online service.

Q248 Chairman: Taking an example you quoted earlier of the 1841 Census, if I wanted to access that would I have to pay a subscription fee for doing so?
Dr Thomas: Yes, I am afraid you would, yes.

Q249 Chairman: Is this fee going to fund the project or did you get upfront funding from, say, the Lottery fund?

Dr Thomas: No, that was funded entirely by a private sector organisation. I would have to check this but I think we get some royalties from that¹.

Q250 Chairman: So it was an investment worth making.

Dr Thomas: Absolutely.

Q251 Baroness Finlay of Llandaff: Can I follow on from the accessibility question because there seems to be a potential payoff between the quality of the record that you digitise and then the size of the files on which it is held and their accessibility and the ability of some people in a public way to access and download the image or information and so on. I wonder how much you were involved in having to compromise on quality for accessibility, and whether the services and products available to the public are lagging far behind what would be required for good access to some digitised material.

Dr Thomas: I will try and answer that question but it is quite difficult. When we started digitisation one of the main concerns we had was the fact that not everybody had broadband and we had to restrict the file size we delivered to about 1MB. So if you wanted a will and it was very long we cut it up into chunks and delivered quite small packages. Obviously, since then people have got broadband and maybe, in the future, we will change our standard and deliver slightly larger packages. In terms of the actual digitisation standards, in terms of pixels per image, we have got a standard for that which we think is a fair compromise between legibility and the size of file which would result. We do not produce very, very high quality, 50MB colour image files; we produce a file which we think is readable on screen. We are not producing something of reproduction print quality; we are producing something you can read on the screen.

Ms Shenton: If I can quote a couple of major digitisation projects we have got, with both the International Dunhuang project and the Codex Sinaiticus project the aim is to make those accessible

to anyone in the world, whereas all the different parts of that are already in different parts of the world and they are of a quality that a scholar can read.

Mr Poole: Just on behalf of the museums community, one of the issues that we are facing is that, obviously, digitising an object, a three-dimensional object, and providing a meaningful way of accessing that object is quite a complex process. What you tend to have instead is a two-dimensional representation. Three-dimensional walk around things like Grecian urns are necessarily huge file sizes and require embedded technologies. What we tend to try to have done in the museum sector is you create a high-quality source image at the point of digitisation and that is the image which you preserve. You then use that to generate a series of images and those enable different levels of access.

Dr Thomas: I think what we would say is that we produce an image of research quality.

Q252 Chairman: This is a question which is partly directed to Mr Poole and perhaps he would like to answer it first, but the written evidence from MDA notes that the only sustained investment in R&D activity is made by commercial organisations which do not benefit the whole sector. The evidence also notes that museums have tended to develop “home-grown” IT systems, rather than using well-established commercial products such as search engines. Are the major collections in this respect too inward-looking? What is being done to promote synergies between the public and private sectors?

Mr Poole: There are a number of questions wrapped up there. If I may just qualify, first of all, the statement from the evidence. What we tend to see in the museum sector is that the majority of this activity is project funded—to be operated in a project funded climate which necessarily means that museums go to tender for a specific function and secure a specific system. What there tends not to be is long-term, ongoing investment in research and development which is not necessarily purposeful or pedagogical but which is for the general benefit. So what we tend to see is research and development activity within organisations or within commercial companies because it is to their commercial and competitive advantage to generate new features for their products. The beneficiaries of their products are then their specific clients. An example, I think, from our sector specifically is the use of geographic information systems and global positioning systems, where a large number of commercial providers are building in location based services into their products, whereas there is relatively little, or almost none that I am aware of, ongoing research and development within museums about location based services. In terms of the development of home-grown

¹ TNA receives royalties as a percentage of sales.

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IT systems, I think that does tend to be true within the museum sector; that there is a strong tendency to create localised ways of bringing together information about museum collections and home-grown collections where large-scale investment has gone into the creation of very successful commercial solutions elsewhere. I am very keen to support museums in contributing to what is known as the non-information environment—the environment of digital information about museum, library and archive collections. By the same token, I think it is very important, because they are the public volume of cultural heritage, that those collections should be accessible through services such as search engines which people naturally use.

Dr Field: The approach in the British Library is not dissimilar, although we are properly now much less dependent on home-grown systems than we were. Indeed, our default approach is really off-the-shelf industry solutions, unless there is a strong case for an exception being made. Even then, we would actually want to develop with an industry partner in terms of ensuring that product could have a sustainable development path. So, for example, we have a library management system which deals with our acquisitions, the collection management functions and also provides our online public access catalogue, which you will find on the web. One of the things we wanted to extend our reach was in the preservation and conservation area, so that as well as having catalogue records which describe essentially what was in the Library and what the provenance was, we could actually link that in an integrated way to a record of preservation and conservation treatment. Now, it so happened that the off-the-shelf product which we have bought, which has been in use in thousands of libraries throughout the world, did not actually have that system there because the critical mass and the large-scale we are operating in meant that other customers of that system had not developed that. So we engaged, essentially, in a joint development of that which benefited us but then became embedded in the product, and therefore available to other customers, and it then gets a sustainable development path in. So it reduces the risk of the British Library being dependent upon obsolescent technology but it does enable us to use, essentially, core functionality to extend in areas where we want to go. Ten to twenty years ago we might well have decided to develop a stand-alone system just for dealing with preservation and conservation.

Q253 Chairman: Is that system the one you have been developing in conjunction with Microsoft?

Dr Field: No, that particular system is being developed in conjunction with a company called Ex Libris who are actually providers of a library management system. The work we are actually doing with Microsoft, which is at a variety of levels, some of which surround digitisation, as I think we have covered in our oral evidence, some of it is around the development of a digital asset management system where we are actually using Microsoft's technology. You cannot go out and sort of procure a digital asset management system off the shelf, but what you can do is to use standard industry components to actually build that. So Microsoft is very much a partner in that at the industry level but we are also working with them at the desktop level, in terms of integrating the delivery of our services to researcher desktops, and so on.

Q254 Chairman: Am I also right in thinking that you are developing an open standard for office file format?

Dr Field: Yes, again we are working with Microsoft and other players. That, again, comes back to recognising the enormity of the digital challenge which we actually have in terms of moving towards a much more standardised way of dealing with file formats, and so on. You can imagine that our role, essentially, is largely the recipient of materials which others produce. The nightmare would actually be for us to try to manage that digital asset if, effectively, everybody was doing things in their own way. So the more we can actually influence the development of standards the better.

Q255 Chairman: Who is funding these various initiatives? Are they coming from internal funds or are you getting help from, for example, Microsoft?

Dr Field: Microsoft is providing a lot of technology support in kind on some of the R&D aspects of what we are doing. They are also funding directly the programme of digitisation which we announced in the autumn. Effectively, they are engaging a sub-contractor who will do the digitisation of British Library material on British Library premises and will be paying directly for that. So that is entirely being funded by Microsoft and the outcome of that will be made available through the British Library website freely.

Q256 Baroness Finlay of Llandaff: I have a short follow-up to that because I wonder if you could explain how it is that Microsoft is the lead player in the field. The reason I ask is that I am aware that Apple systems are often used by people in the photography and art world—the digital graphics world—because of the quality of the images that are obtainable, which they felt have been higher.

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I wonder if there is any history behind that involvement.

Dr Field: I cannot comment on Apple technology, I am afraid.

Q257 Baroness Finlay of Llandaff: It is just from discussions I have had with photographers.

Dr Thomas: I think it is used very largely in the imaging and printing industry. So far we have not had Apple in our digitised archives so it has not been a problem for us.

Q258 Chairman: I have one last issue that I would like to raise with you. I know that at the time of the review that you undertook one of the issues that emerged out of that was the issue of careers and career structure within the service. I would just like to ask how far you feel that in appointing—and both the National Archives and the British Library have made these substantial appointments in research—how far you feel that this is beginning to have an effect on career development within conservation science and how far the initiatives that you have taken are beginning to attract young scientists to work in this area?

Ms Shenton: I think when we appointed Dr Knight as our first Head of Conservation Research we became the richer for it and English Heritage became the poorer for it. It was interesting that in the field there was no one in conservation research in libraries or archives who was available for us to poach, let alone to appoint. Out of that we are about to recruit for a three-year peripatetic conservation scientist to run projects that I have mentioned, and we would look very much towards that being a development role. I think that is the situation.

Ms Bell: It is a two-edged sword. We were able to appoint an assistant who is very young and certainly a very good budding scientist but, as I believe this Committee has heard, it is a good time for conservation scientists, but people want long-term,

permanent jobs, and often it means the world in which we are operating is three-year posts because of three-year funding cycles. I think it is a good time for the development of conservation scientist posts and I think there are people coming up the ranks and there is movement, in Europe certainly and North America, but we have to be able to attract and retain through sustained funding.

Ms Shenton: The other aspect to this at BL is that we also want to use this whole creation of conservation research to develop our own staff on collection care. Again, part of this whole, joined up, stewardship strategy and vision for the new centre for conservation is that it is not this science out there in an isolated box but that there are opportunities for our own staff to be engaged in projects that are for our particular objects.

Dr Field: Again, extending that, part of the brief of the conservation centre which opens next year is around public awareness. One of the exciting things about public programmes and education programmes is to be able to demonstrate how modern conservation continues to owe much to traditional crafts but, also, to applying the latest scientific research. So we hope that by creating that sort of climate of raising awareness of how science can actually help in conservation as well as, clearly, by some of the vocational work we are doing we will generally raise awareness across the piece.

Q259 Chairman: I shall look forward to coming and visiting you.

Dr Field: You will be most welcome indeed.

Q260 Chairman: I think that brings us to the end of this session. Can I thank you all very much for coming and answering all the questions that we have put to you; you have been very patient and we are very grateful to you.

Dr Field: My Lord Chairman, it has been a great pleasure.

Dr Thomas: Thank you very much.

TUESDAY 9 MAY 2006

Present	Chorley, L Hilton of Eggardon, B Paul, L	Sharp of Guildford, B. (Chairman) Young of Graffham, L
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Memorandum by English Heritage

1. EXECUTIVE SUMMARY

1.1 English Heritage appreciates the Select Committee's decision to examine science and heritage. We and our predecessor organisations have a long history of interest in conservation science and we are keen to help lead, develop and co-ordinate the field with others for the benefit of this and future generations and their enjoyment of the historic environment.

1.2 The publication of our Research Strategy last year, together with our proposal to help develop a UK-wide research framework for the historic environment and its sustainable management, will hopefully act as catalysts to draw together interested parties, first to map SET-based activities and funding, and then prioritise future actions and research. Especially important developments include the forthcoming signing of a concordat between English Heritage and the Arts and Humanities Research Council; the Historic Environment Research Meetings with interested parties amongst RCUK; and the forthcoming research networks event sponsored by the councils and English Heritage.

1.3 Much work remains to be done to assess the labour market needs for the sector but models for making these assessments are in place and are planned for implementation with others in the year ahead.

1.4 The UK performs quite well in developing scientific materials and techniques for conservation with small and medium sized enterprises taking most of the risks and rewards from technology transfer, mostly through electronics. The public sector sponsorship of these near market developments is poor with notable exceptions.

1.5 Finally, much more can and should be done to use both conservation science and information technology to improve and enhance public engagement with objects of cultural importance and their conservation. Better use can also be made of conservation science to make the public aware of science and technology and of the part they play in cultural heritage.

2. ENGLISH HERITAGE

2.1 English Heritage is the lead body for the conservation of England's historic environment. We were established by Parliament in the National Heritage Act 1983 and were merged with the Royal Commission for Historical Monuments in England in 1999. More recently we were given extra responsibilities for the historic maritime environment by the National Heritage Act 2002. English Heritage employs around 1,800 staff based in London, in nine regional offices and at the National Monuments Record Centre, Swindon, operating on an annual budget of £165 million. We look after and provide access to over 400 nationally important historic sites in England, as well as World Heritage Sites, including Stonehenge and Hadrian's Wall. We advise English national, regional and local government and the public on heritage issues and provide grants for the conservation of scheduled monuments, listed buildings and conservation areas, among other historic resources.

2.2 English Heritage and its predecessor bodies have been using research for over one hundred years to understand and manage the historic environment. Since the end of the nineteenth century, inspectors, investigators and surveyors from the state's heritage services have used archaeological and historical research to better understand the development of the English landscape, its architecture and artefacts. Architects, engineers, conservators and other scientists have also been employed to analyse material deterioration processes, and to devise and test new treatments to arrest their decay (Office of Works, 1913).

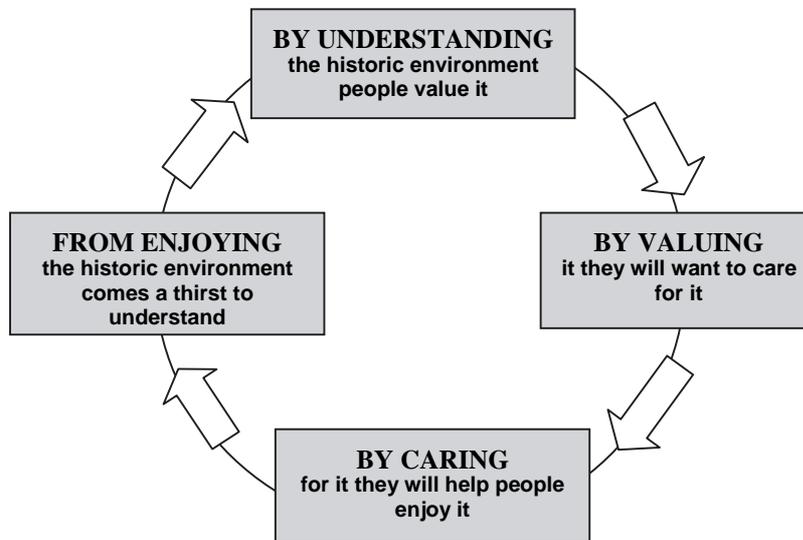
2.3 Currently we spend £9.8 million (6 per cent of our budget) on all forms of research, development and innovation, including £6.2 million of research grants and research contractors' fees and expenses, and staff costs involved in carrying out, administering and managing the work. Fifty two full time equivalent (FTE) staff (3 per cent of the workforce) are involved in research representing a similar number of research disciplines and two hundred and seventy five external research partners and contractors help to deliver the programme. Most of our research is based in the arts and humanities, especially in the fields of archaeology and history. There is also growth in socio-economic studies to help provide the evidence base for policy development but

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science, engineering and technology (SET), and particularly conservation science, remain essential components of our research activity to help find, record, date, assess the condition of, and care for the nation's heritage. With 340 research projects currently underway, 52 (15 per cent) are SET-based costing around £1.5 million.

2.4 Last year we published the English Heritage Research Strategy, *Discovering the Past, Shaping the Future*: providing the knowledge base for the historic environment and its sustainable management. Together with its associated Research Agenda of themes and programmes (English Heritage 2005), in which SET play an important part, the Research Strategy is intended to support our corporate strategy, *Making the Past Part of our Future* and its priorities for 2005–10 (English Heritage, 2005) based on the heritage cycle (Figure 1).

Fig 1 The Heritage Cycle



2.5 Our Research Strategy responds to the Government's policy document, *The Historic Environment: A Force for Our Future* (DCMS & DTLR, 2001) where calls were made for sectoral leadership, clarity of purpose and a transparent plan for research. It takes account of the DCMS Science and Innovation Strategy (2002), its Research Strategy for 2003–06 (2003), and of the Office of Science and Technology's Science Review of the Department for Culture, Media and Sport (DTi, 2004) and the DCMS' response. Of particular interest to this Committee will be our proposal to help co-ordinate a UK-wide research strategy for the historic environment and its sustainable management.

2.6 English Heritage's research is at the applied end of the spectrum, linked directly to our regional casework through involvement in providing technical and other advice to property owners and local planning authorities. We also undertake research on the historic properties in our care using them as testing grounds and laboratories for innovative technologies. The broad span and multi-disciplinary nature of our research, often cross-linking between the arts and humanities and SET, are driven by our holistic approach to problem-solving and by our understanding of, and belief in, the long view of sustainability.

2.7 Classified as a Public Sector Research Establishment (PSRE) by the OST, English Heritage is well placed to deliver knowledge transfer for SET in the heritage field. We stimulate and review public policy on the basis of our own research. We set our own technical and scientific policies; create our own national standards, and contribute towards those of the British Standards Institution. We publish extensive guidance for the public ranging from academic papers in peer reviewed journals, through to seminal text books and free advisory leaflets and website information.

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3. TERMS OF REFERENCE AND DEFINITIONS

English Heritage terms of reference

3.1 English Heritage's role and responsibilities are set out in the afore-mentioned legislation. We are responsible to the Department for Culture, Media and Sport (DCMS) and have a three-part funding agreement with it, the Office of the Deputy Prime Minister (ODPM) and the Department for the Environment, Food and Rural Affairs (Defra).

3.2 We have interests in all parts of the historic environment (English Heritage, 2000) but especially concerned with the "immoveable" cultural heritage ie connected with monuments and buildings (and their fixtures and fittings); archaeological sites and landscapes; historic areas, battlefields, parks and gardens; and the maritime heritage—aspects of which, we understand are beyond the remit of the Committee's inquiry, though they also require SET support for their conservation and presentation to the public.

3.3 The responsibility for the "moveable" heritage lies with the Museums Libraries and Archives Council (MLA), and the national museums and galleries. We are registered as a museum body and public archive and hold significant collections of fine art and furniture, archaeological finds, and prints, drawings and photographs much of which we display at our historic properties or make available through our reserve collections or the National Monuments Record and on-line. Therefore aspects of the inquiry concerned with collections care, management and access also fall to us to answer.

3.4 The Committee's call for evidence stated that its line of inquiry would encompass the United Kingdom as a whole. English Heritage can only provide evidence on its own work and perspective in England and in the international arena. Its sister organisations in Scotland (Historic Scotland), Wales (Cadw) and Northern Ireland (the Environment and Heritage Service) provide similar services to those we offer in their home countries.

Definitions

3.5 English Heritage understands the Committee's use of the term "science, engineering and technology" (SET) and uses the *Frascati* definitions (OECD, 1994) extensively in its own work and in relation to that of others, thanks to the advice of the Office of Science and Technology (OST). It may help the Committee when considering evidence on "conservation science" to understand that the field covers a number of rather different application areas; while these share some common ground, there are important differences of perspective, practice and provision which relate to the types of heritage assets being understood, conserved and/or managed. These include:

- Fine art conservation;
- Non-fine-art collections care;
- Management of *in situ* archaeology;
- Building conservation.

Most of the detailed examples given below relate to buildings conservation; many of the general comments apply in these other areas, though the detail and emphasis vary.

3.6 We are currently undertaking a two-stage public consultation on new English Heritage *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* (2006) wherein we define "conservation" as:

The process of managing change in ways that will sustain the values of a place in its contexts, and which recognises opportunities to reveal and reinforce those values.

In this definition, a "place" is defined as any part of the historic environment, of any scale, that has an identity perceived by people—eg an artefact, monument, building, area or landscape etc

3.7 English Heritage understands the term "Conservation Science" as the scientific examination, analytical study and treatment of historic buildings, sites and moveable objects in order to better understand and conserve them, which includes determination of:

- their constituent materials and methods of construction and alteration;
- their state of welfare (ageing, damage and instability) and rates, types and products of deterioration;
- the underlying causes of decay and sensitivities to treatment;
- whether the objects are authentic, much repaired or are fakes;

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- whether previous treatments are harmful and how they should be removed.

The term is also used by those designing and implementing new treatments, or analysing or designing the environments in which the objects are sited or are displayed. Technical findings from scientific investigation can also be used for archaeological or art historical studies unconnected to conservation eg archaeometry.

3.8 We set out below answers to the questions posed in the Committee's call for evidence.

4. CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

4.1 There is a lack of coherence at present, though co-ordination does take place in a variety of ways. Improvements are being made or suggested, as set out below.

National co-ordination

4.2 Responsibility for the UK's cultural heritage is shared between DCMS and the devolved administrations; and through and between their non-departmental public bodies (NDPBs) and agencies. Responsibility for the UK science base lies with OST and SET interests with the research councils (RCUK).

4.3 In England, there is an administrative split between the "immoveable" and "moveable" heritage interests—between English Heritage, and the MLA and the national museums and galleries. In the "immoveable" field, there is also an administrative separation between the UK's heritage agencies for the four home countries. While the lack of a Chief Scientific Advisor within DCMS (OST, 2004) could be said to be a hindrance to improved co-ordination, English Heritage believes that the specialist agencies should, can and do help to shape the field for themselves.

4.4 DCMS has been encouraging its family of agencies to meet more frequently to share best practice and co-ordinate activities and new developments. The Chief Executives of the home countries heritage services already meet regularly and specialist staff are involved in a variety of co-ordinating activities. More could be done in this regard especially at the scientific and technical levels between the NDPBs and the national museums and galleries, as was recommended by the recent OST review of the use of science by DCMS.

4.5 Bi-lateral and consortia-based activities are often very fruitful. There is some informal equipment and expertise sharing between the national museums, galleries and archives, but there also appears to be a degree of overlap and duplication of scientific analytical equipment. On building conservation, English Heritage and Historic Scotland both have strong SET interests and outsource their research from universities, private sector building science laboratories and consultants. They have successfully collaborated on scientific research concerned with timber decay in buildings, resulting in a definitive publication (Ridout, 2000). A recent initiative bringing together the Heads of Conservation from 10 major institutions is certainly a move in the right direction with a commitment to share research strategies and to look for opportunities to work together.

4.6 English Heritage is planning to re-establish the British Isles Technical Forum (BITF) in 2006 to enable the heritage agencies of the four home countries plus opposite numbers from the Office of Public Works and the Heritage Council in the Irish Republic to meet to discuss SET issues, including aspects of the co-ordination of conservation science. We hope that the professional institutes involved in conservation in the UK will also participate. They are:

- ICON (for conservators);
- Institute of Conservation Scientists;
- IHBC (for conservation officers in local planning authorities);
- RIBA (architects);
- RICS (building surveyors);
- ICE & IStructE (civil and structural engineers);
- CIBSE (building services engineers).

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International co-ordination

4.7 UNESCO helps to co-ordinate international efforts for World Heritage Sites through its World Heritage Centre in Paris. Most of the Centre's efforts are currently spent on administering the World Heritage Convention through the designation of the Sites and in monitoring their welfare. However, UNESCO has also established specialist scientific committees in the past to oversee the conservation efforts on internationally significant sites such as the Parthenon and the Taj Mahal.

4.8 A sister organisation to UNESCO is ICCROM, the International Centre for the Conservation and Restoration of Cultural Property based in Rome. This small inter-governmental organisation is concerned with post graduate mid-career education and training, and research and information management concerned with conservation. The funding of UK membership of ICCROM and the UK's representation at its management meetings has been delegated to English Heritage and the MLA who share the costs and responsibilities on behalf of DCMS. Currently, English Heritage's Conservation Director is Vice President of ICCROM's Council, responsible for its training programmes.

4.9 ICCROM retains a very strong interest in SET-based activities for "immoveable" and "moveable" heritage and is currently reorganising its training programmes to deliver more technical and scientific courses in Rome and on specialist satellite courses elsewhere. English Heritage contributes to these programmes and has just sent its eminent mycologist-entomologist to Norway to help plan the forthcoming international timber conservation course.

Professional and academic links at national and international levels

4.10 There are a wide variety of informal links at national and international level that help to foster and co-ordinate interests, standards, research and knowledge transfer in conservation science. There is a specific focus for conservation science for fine art conservation and collections care through ICON, the Institute for Conservation which brings together public and private sector professional conservators with an array of scientists interested in conservation: some with dual qualifications. The new Institute is to be applauded for bringing together and merging several discrete specialist bodies in the last twelve months. Disappointingly it was not able to persuade scientists working in or adjacent to conservation departments in the public sector to join the conservators in significant numbers. An Institute of Conservation Scientists has been formed instead to cater for their discrete needs and we look forward to working with both bodies in the years ahead.

4.11 At the international level, conservators and conservation scientists are catered for through international professional groupings: the International Institute for Conservation (IIC) and the International Council of Museums Committee for Conservation (ICOM-CC), both of which run serious academic peer-reviewed journals and large scale international conferences. ICOM has materials working groups of which some achieve excellence whilst others are moribund.

4.12 For building conservation, SET-based interests bring together architects, surveyors, engineers and building and materials scientists in a less well-articulated set of interest groups based on specialist societies because their professional institutes see conservation as a minor sectoral interest. UK bodies include the Association for Studies in the Conservation of Historic Buildings (ASCHB) and the British Building Limes Forum, but their membership numbers are very modest. Nevertheless, they do publish learned transactions of their meetings and work hard to bring multi-disciplinary interests together.

4.13 At an international level, the International Council on Monuments and Sites (ICOMOS) has national and international specialist scientific committees based on materials (eg Stone, Wood, Architectural Ceramics, Earth) and processes (eg Recording and Documentation, Education etc)—many of them with a SET focus. ICOMOS specialist committees, together with the North American Association for Preservation Technology (APT) again produce academic conference proceedings and technical journals which help set standards and push forward the boundaries of knowledge.

4.14 Many of these professional interests overlap in what is a small national and international field with many people belonging to all the above-mentioned organisations.

Research interests

4.15 Concerning research interests, English Heritage is already working very closely with the Arts and Humanities Research Council (AHRC) and is about to sign a concordat to cement our common interests in the historic environment. Part of this collaboration also involves working with other interested parties from RCUK and the establishment of the Historic Environment Research Meeting (HERM) to work towards cross-cutting multidisciplinary research in the field. As part of this co-ordination English Heritage, AHRC,

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EPSRC, ESRC and NERC are to host a facilitated event in Birmingham in March 2006 called, *Preserving Our Past* where we hope to foster the development of academic research networks. Clearly SET interests here lie with AHRC, NERC and EPSRC, though BBSRC funding has also played a role in previous research concerned with timber pest species in the heritage field.

4.16 English Heritage has also been working with built environment and construction industry partners, the DTI-Construction Support Unit and the Commission for Architecture and the Built Environment (CABE) through the Construction Research and Innovation Strategy Panel (*n*CRISP) to deliver a foresight plan for future research priorities concerned with the conservation, repair, maintenance and improvement (CRMI) of the built environment.

4.17 A key component of the English Heritage Research Strategy is our proposal to help deliver a UK-wide research strategy for the historic environment by March 2007. We argue that public, charitable and private sector bodies funding research, existing research networks and the end-users of research should combine together to share their perceptions of the key threats and opportunities confronting the historic environment over the next five to 10 years, and of the key research questions needing to be solved, in order to assemble a common research framework, shared strategy or alignment of strategic research plans to help prioritise and co-ordinate action and resources for the common good.

4.18 In establishing contacts to take this work forward, it became clear to us that simply co-ordinating links in England for the heritage sector would be ineffective. There were constituencies across the UK, particularly our sister heritage organisations in the devolved administrations in Wales, Scotland and Northern Ireland, and in fields only loosely or not at all associated with the historic environment sector that also had an interest in the development of a co-ordinated approach to research in this and adjacent areas. Bodies with cultural and environmental interests clearly have common ground. But in many academic research disciplines (arts, humanities, science, engineering and technology) where the historic environment provides interesting research questions for study, and in industries related to the historic environment (eg agriculture, construction and tourism) where common answers to common questions are sorely needed, there appear to be wider synergies that make the idea of a more ambitious research strategy more appealing.

Co-ordinating international research

4.19 There is also interest amongst some EU states' heritage services (in Sweden, Ireland and the Netherlands) for taking forward the English Heritage idea to now devise an EU-wide co-ordinated research strategy for the historic environment and its sustainable management. Although British SET research interests have benefited greatly from participation in the EC Research Frameworks over the years, those involved in conservation science have seen grant funding reduced or overlooked in many of the research platforms under discussion for the 6th and 7th grant Frameworks. EC officials argue that heritage interests are a "subsidiarity" issue solely to be dealt with by member states and cannot be addressed strategically in their funding streams. However, they have helpfully hinted that—should member states themselves devise a common research framework for Europe's heritage—then the EC could not ignore such a strategy and would have to help fund it.

4.20 English Heritage staff made a presentation on this idea to MEPs in Brussels in February which was warmly received. A paper on the subject has also been accepted for the EC Research Directorate's Scientific Conference in Prague in May—so interest in adopting the concept for Europe is gathering pace. The proposal also found wider international interest when it was presented to the 124 member states of the inter-governmental organisation, ICCROM (the International Centre for the Conservation and Restoration of Cultural Property) in Rome last November. Here Japan, the USA and Canada all expressed interest in a global framework for research on the historic environment and asked to be kept informed of developments.

Further work to help co-ordinate the field

4.21 Every year in November, English Heritage publishes detailed national and regional statistics on the welfare of the country's heritage. Entitled *Heritage Counts: the state of England's historic environment*, the document reports on behalf of the Historic Environment Review Steering Group, a cross section of interests in the sector. The themed title for the 2006 edition is "Communities", defined in the broadest sense, and will include a review of English "research communities"—including publication of data just now starting to be gathered for analysis on the size and scope of SET research on the historic environment, including conservation science.

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Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

Adequate funding?

4.22 We cannot say. On funding, we do not yet have a clear picture of all the current English, UK or EC expenditure in the field. This is because SET-based services and research are diversified across a very broad field with a wide range of funding sources and no organisation has so far been willing or able to collect, collate and analyse the data. However, English Heritage is asking RCUK to work with it and the other heritage bodies to make an assessment of the situation but this will take time and not be ready before the conclusion of the Committee's work.

4.23 The problem is difficult for many of the research councils because their data gathering is based on the classification and evaluation of the science, not generally on the particular field(s) to which it is applied. Thus for example, a grant from EPSRC to a surface physics/interface science laboratory connected with lime-based mortars might not obviously stand out as a heritage-based conservation project. Recent work by University College London's Centre for Sustainable Heritage on behalf of a consortium of Heads of Conservation from ten leading institutions also discovered that it was hard to unpick data for the home countries from UK data sets because of the way they were originally collected. None of these are insurmountable problems and we shall strive to acquire sound data in the year ahead.

4.24 Sources of funding and SET-based activity include:

- English Heritage and the other three home country heritage services;
- Collaborative work by English Heritage, Historic Royal Palaces Trust and the National Trust;
- Research grants from AHRC, EPSRC, NERC, CCLRC and BBSRC;
- Research grants from the Leverhulme and other trusts and foundations;
- DTi; Defra and ODPM for sponsored research;
- Aggregates Levy Sustainability Fund research (Defra via English Heritage);
- Regional Development Agencies;
- Trade research associations eg CIRIA, TRADA etc;
- Trade associations eg Lead Sheet Association;
- Private test houses eg BRE;
- EC Research Directorate Framework Grants;
- EC Education and Culture Directorate Grants;
- Shared cost international research with the Getty Conservation Institute, Canadian Conservation Institute etc.

4.25 The background work for studies of funding for SET-based research in the built environment and construction field in the UK has already been undertaken by CABE for nCRISP. This suggests the top 10 public research funders' total expenditure is around £675 million per year with a heavy emphasis on construction-based research. Estimates of SET-based activity for the conservation, repair, maintenance and improvement component have not yet been made: a challenge for future study.

Appropriately directed?

4.26 Again, the question is telling and we do not yet have a good answer—though steps are in hand to evaluate the situation. There has been a growing trend to use SET-based services to assist conservation practice over the last three decades, particularly emphasised in analytical techniques, remote sensing and environmental monitoring work. Part of this increased reliance on conservation science has come about because of increased ethical concerns to retain rather than to restore or replace original fabric in the course of any intervention with the cultural heritage. This is based on the tenets of the Venice Charter (ICOMOS, 1966) which require all conservation work to be urgent, necessary, minimal and non-prejudicial to future interventions—demanding SET-based assistance to determine the status of the historic asset and benign means to stabilise it.

4.27 In the field of research, again there is as yet no consensus on what might be the pressing priorities for the years ahead. Horizon-scanning work by English Heritage for its own research strategy has led to three of its seven research themes for 2005–10 having SET-based components and they include:

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- Theme A: discovering, studying and defining historic assets and their significance: knowledge and understanding are recognised as critical to effective conservation;
- Theme D: studying and assessing the risks to historic assets and devising responses: these include the increasing rate of human impact and the effect of climate change on the historic environment; and
- Theme F: Studying and developing information management.

4.28 English Heritage, Historic Scotland and others worked with nCRISP to produce a foresight plan in 2005 for future research priorities for the conservation, repair, maintenance and improvement segment of the construction industry. But the Task Group programme and nCRISP's activities were wound up before a wider public debate could validate the results. However, we see the new discussions relating to English Heritage's proposal for a UK-wide research strategy for the historic environment and its sustainable management as taking this forward. New focus groups will be required to consider the forthcoming threats and opportunities confronting cultural heritage and to suggest priorities for action. They will form the basis of the research framework referred to above.

Capacity and skills?

4.29 Again, strategic data and analysis in this area are sorely lacking and need to be tackled. English Heritage has become involved with the Sector Skills Councils for the construction industry (ConstructionSkills) and for the land-based industries (Lantra) especially for horticultural interests for parks and gardens. We are also interested in the new Sector Skills Council for the cultural and creative industries (CCI) because of its links to archaeology and conservation. We see these links as the means to establish firm assessments and plans for specific labour markets.

4.30 For example, with CITB-ConstructionSkills we signed a DfES-approved "sector skills agreement" worth £240,000 per year to foster craft and other skills development for historic buildings conservation. Research work through labour market studies in 2005 focused on traditional building crafts. We are now evaluating a report on architectural conservators before publication that reveals that some of the UK's best training programmes are devoted to a majority of foreign students. Next year we shall be starting to look at white collar skills eg architectural and engineering competencies, so it may be feasible for us to also look at the provision of conservation scientists in association with the CCI, the MLA and other interested parties. On the collections conservation side, English Heritage is already involved in supervising an MA in conservation science in historic properties as part of the Royal College of Art/V&A Museum conservation course.

4.31 Cut-backs in funding for museums and other public institutions with conservation science facilities have led to staff reductions and a decrease in capacity and research activity particularly affecting non-fine art collections and archaeological conservation; master's courses have closed at De Montfort and Durham universities. Consequently the opportunities for career path developments are modest in an already tiny field. Our suspicion in the engineering professions is that many of the most skilled structural engineers specialising in conservation engineering are nearing retirement with only limited numbers of replacements in view. There are few opportunities in higher education for engineers to learn the history of architecture and engineering; to understand the details of historic building construction; or to gain an ethical, technical and scientific understanding of building conservation. Therefore we have opened discussions with the Institutions of Civil and Structural Engineering to see what can be done.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

4.32 The UK performs quite well in developing new scientific techniques and products for heritage conservation (though on the collections conservation side the leading practitioners in Europe are Italy and the Netherlands). It is a small market place nevertheless and the small and medium sized enterprises achieving growth and developments in this area have done so by exporting. In many instances, their great achievements have been to transfer technology from other industrial applications.

4.33 Examples include:

- Hanwell and other radio monitoring of environmental conditions;
- Structural Statics Ltd and BRE use of Linear Variable Differential Transducers (LVDTs), telemetry and software to sense structural dynamics;
- GB Geotechnics use of pulse radar for the assessment of buildings;

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- Taywood Engineering and Rowan Technology use of impulse cathodic protection of buried metal cramps in masonry and concrete reinforcement;
- Olympus KMI's development of building endoscopes and now micro remote digital imaging;
- Dosimeter technology;
- Ridout Associates and Hutton & Rostron "smart" building technology to alert facilities managers to moisture ingress;
- Pheromone traps for timber and textile pest species.

Is there a satisfactory process to develop practical applications of conservation research for the market?

4.34 No. The heritage bodies have little or no funds to sponsor the industrial development of promising techniques, materials or equipment. We can of course loan our sites, buildings and collections for controlled trials and testing. In the case of the mysterious failures of lead sheet roofing some years ago, which we discovered on our own sites and in our grant aided work, we commissioned field studies and laboratory testing with others to determine the exact causes of the deterioration and worked with our consultant corrosion physicists to establish a cheap and effective pre-treatment which is now commonly used in the roofing industry. In this case, we established a patent to control the quality of the treatment rather than to exploit a funding stream.

4.35 An important point to note is that there have been many instances where the large international petro-chemical manufacturers have proposed new materials for the English conservation market place but have been found wanting because of their lack of understanding of the conservation field, its ethical base and the past histories of well-meaning though totally inappropriate treatments. So the heritage bodies have a role to play in policing the market place and advising industry of the sensitivities involved in conservation.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

4.36 Yes. Experiments have been made by various museums, some rewarded at the ICON Conservation Awards, to show the general public what happens to ageing artefacts and fine art if left in poor conditions. These SET-based exhibitions and inter-active exercises between scientists, conservators and curators help not only to show what happens "behind the scenes" in museums and galleries, but they also help the public to understand and appreciate how to look after their own antiques and works of art.

4.37 English Heritage has a long duration weathering station at Housesteads Fort on Hadrian's Wall where lime-based mortar test cubes have been exposed for several years after laboratory testing. The site and test rigs are a proxy for years of frost and rain damage of repair mortars in the Wall itself. Furthermore, there are messages for the public in knowing what forms of mortar to choose in repairing their own homes. Plans are now being prepared to make a better exhibition on this test site and in the local museum: to explain what types of experiments have taken place here and why.

5. USE OF INFORMATION TECHNOLOGY

In what ways can information technology contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

5.1 One of the most powerful influences on the public in recent years has been Channel 4 TV's *Time Team* collaboration with archaeologists, palaeontologists, forensic modellers, archaeo-botanists and other scientists including English Heritage's experts in "Geo-physics" ie geophysics involving remote sensing technology such as aerial photography and the use of fluxgate potentiometers, resistivity devices, and magnetometry and pulse radar surveys. The television shows are complementary to heritage conservation in that they are mostly about preservation by record. Nevertheless they are both entertaining and informative.

5.2 Information Technology (IT) has allowed the public to gain access to otherwise restricted sites and artefacts which are at risk from damage due to wear and tear, or from the environmental standards necessary for human comfort and convenience. At English Heritage's site, Richmond Castle in North Yorkshire, for example, we have used Closed Circuit Television to provide visual access to the poignant graffiti of Conscientious Objectors held in gaol cells here during World War I. The inscriptions lie on fragile white-washed plaster walls in narrow spaces which, if opened to the public, would be at risk of loss through abrasion.

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We have also experimented with virtual reality graphics to “walk” physically disabled tourists around our more inaccessible sites when other means of access would be impractical.

5.3 At a more strategic level, as the Committee will know, the on-going revolution in IT has the potential to deliver cultural services and resources with greater efficiency and effectiveness, as well as engage communities and citizens in new ways in the provision of learning and leisure opportunities. Central to the concept of e-government in the UK is a network of shared knowledge and a knowledge economy, global in dissemination, that will improve opportunities for all. Concerns have been raised in the past about too much information being made available on the internet which might encourage metal-detecting thefts from archaeological sites. On balance, we believe that the benefits for cultural heritage of engaging with a wider public through IT outweigh the risks.

5.4 So we have embarked with the Association of Local Government Archaeological Officers (ALGAO) and the IHBC on a five-year project to build a “Heritage Gateway” to England’s historic environment records. The project’s system architecture will employ web services to search local and national datasets across the sector. The project hopes to web-enable local Historic Environment Records (formerly known as Sites and Monument Records) where it is not already available online. In turn, IT delivery ought to limit access damage to fragile paper and other records.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

5.5 Public bodies should work in partnership to provide services which transcend organisational and national boundaries. Key to this approach is the need for audience development through a much better understanding of how specialists and the general public use and/or might wish to use the technology.

What, in the UK and internationally, are the best examples of the use of information technology to improve access to and understanding of cultural objects?

5.6 The National Museums and Galleries on Merseyside have a Conservation Centre whose staff and work are often exposed to the public as part of the didactic exhibition. Often a live, interactive, TV link from the visiting public to the conservation studio enables a dialogue to take place which helps to present and interpret often complex ethical, scientific and technical information.

5.7 At an international level, the Getty Conservation Institute’s Arts and Archaeology Technical Abstracts service, AATA-Online provides a sophisticated search engine to track down international technical conservation literature for academic and/or practical purposes. This is especially important as there are very few of the sector’s peer reviewed journals which otherwise feature in citation indexes or which can be easily acquired in developing countries. English Heritage contributed to the system’s development and testing and we now ensure that all relevant publications from our SET-based catalogue are abstracted at source to donate additional material.

6. ADDITIONAL COMMENTS AND INFORMATION

Use of heritage to improve public engagement with and understanding of science and technology, and the part they play in our culture

The Committee might be interested to learn of the ways in which the heritage sector works to improve public engagement with and understanding of science and technology and the part they play in our culture.

6.1 Many pioneering engineering structures are statutorily protected as Listed Buildings for their special historic scientific or technical interest. Examples include Kirkaldy’s Testing and Experimental Works, Southwark, London, built in 1872 and listed Grade II (above its entrance door is the famous motto, “Facts not Opinions”); and the Jodrell Bank Radio Telescope in Cheshire, built in 1964 and listed Grade I.

6.2 English Heritage and several local authorities run wall plaque schemes which commemorate famous historic personalities, including scientists and engineers, who lived or worked on the sites or in the buildings to which the plaques are affixed. Our programme is well known as the Blue Plaque scheme originating with the former London County Council.

6.3 We also look after and open to the public the historic residence of Charles Darwin. Down House, in the London Borough of Bromley, is an 18th century country villa with 19th century extensions in which the great man lived from 1842–82, and where he wrote his treatise, “The Origin of the Species” which was published in 1859. The site has recently been nominated by the UK Government for World Heritage Status in the 2006

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submission to UNESCO. The bid is being supported by a consortium of interests including DCMS, English Heritage, The Mayor of London, Bromley Council, the London Development Agency, English Nature, the Natural History Museum, the Wildlife Trusts of London and the Charles Darwin Trust.

6.4 Finally, our staff participate in public awareness raising events throughout the year, including National Archaeology Days, the Festival of History and National Science Week, when we open our laboratories to the public and present illustrated lectures and demonstrations at public meetings.

Memorandum by Museums, Libraries and Archives Councils¹

INTRODUCTION

The Museums, Libraries and Archives Council (MLA), together with its nine Regional Agencies work in partnership to provide strategic direction and leadership to museums, libraries and archives across England. Our common purpose is to improve people's lives through access to the collections and resources of museums, libraries and archives—building knowledge, supporting learning, inspiring creativity and celebrating identity. The partners act collectively for the benefit of the sector and the public, leading the transformation of museums, libraries and archives for the future.

We are grateful for this opportunity to respond to this very important, but often overlooked, aspect of our work. This response focuses on issues relating to the moveable heritage and not to the built heritage or digital preservation.

1. *How is conservation science in the UK and internationally co-ordinated between museums, universities and other organisations? Is there effective transfer of knowledge into practice?*

1.1 Conservation science is carried out at many different levels and in a variety of institution types, including conservation laboratories in museums, libraries, archives and heritage agencies, as well as higher education teaching and research institutions. There are very few establishments throughout the world that are dedicated to conservation research, and the number of individuals whose work is solely related to conservation science is relatively small. In the UK, this activity is concentrated in the large national collections and some university departments. In most cases, the conservation scientists support the work of the conservation team but their role varies depending on the type of institution and the nature of the collections.

1.2 The term “conservation science” covers several distinct areas of work and these are outlined below.

Technical examination of objects and works of art

1.3 The technical examination of objects and works of art is essential in order to identify the materials they are made from, the methods of manufacture or construction, and to determine the nature and extent of deterioration. It is a routine part of the work of all conservators to enable them to develop the most appropriate conservation treatment for the item and/or determine the most appropriate environmental conditions in which to store or display it. The techniques used by conservators are often simple, such as visual examination using low-power microscopy. Very few conservation laboratories have in-house analytical facilities or have well-developed links with university departments that do.

1.4 Some large institutions such as the National Gallery, Tate, British Museum and V&A do have scientists who specialise in the technical examination of objects and works of art and have well equipped analytical laboratories or good links with higher education institutions that do. Some of the conservation scientists' work is to provide an analytical service to support the conservators but they also carry out projects such as the detailed investigations of the pigments used by a particular artist or investigate the chemical composition of a particular type of artefact. Such work has made a major contribution to our knowledge of artists' materials and techniques and archaeo-metallurgy.

1.5 The information resulting from technical examinations normally forms an integral part of an object's documentation. However, it is as important to the art historian, archaeologist etc. as it is to the conservator. The information is used in catalogues, text books, exhibition guides, student study packs and exhibition labels.

¹ This response has been compiled by the national MLA and the nine regional museums, libraries and archives councils, which are: ALM London, EEMLAC, EMLAC, MLA North West, MLA West Midlands, NEMLAC, SEMLAC, SWMLAC and YMLAC.

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1.6 The “forensic” approach to conservation is perhaps most highly developed in the examination of excavated archaeological material, where the nature of the artefact is obscured by corrosion and accretions. Here, examination by X-radiography and with a scanning electron microscope can reveal the complex nature of an artefact and material associated with its burial.

1.7 Such examinations also form an important part of the preliminary examination of paintings, where the information obtained can be important, for example in correct attribution to an artist or the identification of a forgery. Such research is not confined to paintings and a recent programme of work has identified the exact location in Carrara where the stone for Michelangelo’s statue of David was quarried.

1.8 The comprehensive technical examination of artefacts and works of art is recognised as “best practice” but this is only possible in a small number of national collections with research facilities. Most collecting institutions lack the resources to employ conservation scientists or provide the necessary analytical equipment.

Testing the materials used for display and storage

1.9 This work is necessary to ensure that the materials used are not harmful to the objects that will be housed in their vicinity. Conservation scientists at the British Museum developed a series of standard tests (commonly referred to as “Oddy” tests) that are now widely used in the conservation community to evaluate materials. There is now an extensive library of information about materials that are safe or harmful; though this remains an on-going project because manufacturers continually modify the formulation of commonly used products such as paints, particle boards, dyes and flame retardants.

Research into new methods and materials for use in conservation

1.10 This type of research is normally only possible on a small scale within museums and galleries. A notable exception was the development of laser cleaning of sculpture carried out by the Conservation Centre of the National Museums Liverpool during the 1990s. On a smaller scale, there are examples where scientists working alongside conservators have refined conservation treatments by reviewing commercial products and evaluating their performance when applied to cultural material. A recent example of this was a review of mass de-acidification treatments for brittle paper <http://www.mla.gov.uk/documents/infosave—rep.doc>.

1.11 Conservation scientists also investigate problems identified by conservators and curators with the aim of developing protocols or techniques that will reduce the rate of deterioration. A good example of this is the investigations carried out by the National Museum of Scotland into the deterioration of historic plastic artefacts. Over time, their surface discolours, becomes sticky or powdery, or develops crazing. The study demonstrated the inherent instability of many early plastics resulting from poor manufacturing techniques. This is perhaps not surprising as this was an emerging technology in the late 19th and early 20th centuries but the research did identify simple methods that collections managers could use to minimise the rate of deterioration.

Health and safety

1.12 Scientists have an important role to play in identifying hazardous materials within collections. These range from asbestos lagging to the boiler of an old steam engine, radioactive paint on the dials of scientific instruments, radioactive mineral specimens and the residues of arsenic and mercury compounds that were once applied to natural history specimens as insecticides. Neither curators nor conservators are necessarily experts in all aspects of the objects within a collection and though they may suspect a hazard, it remains for scientists to verify this and develop safe procedures to deal with them.

Conservation science in training centres

1.13 Science forms an integral part of all conservation training programmes. Some courses utilise staff from other departments but others have a scientist on the staff to teach and to carry out research, usually in collaboration with others within the university. The Textile Conservation Centre (part of the University of Southampton) is currently carrying out a study monitoring damage to historic tapestries. This collaborative project involving seven partners across Europe aims to improve the care and protection of historic tapestries by developing methods of predicting their future conservation needs.

1.14 Some conservation students are able to carry out research as part of their studies. In particular it is worth mentioning the numerous interesting projects completed by students of the course run jointly by the V&A and Royal College of Art, and also those at the Textile Conservation Centre.

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2. Transfer of knowledge

2.1 The results of conservation science investigations are fed back to the wider community through the traditional routes of conferences, training courses, professional literature and websites. They are organised by the various professional bodies; major international conferences are regularly organised by:

- International Institute of Conservation (IIC) www.iiconservation.org/;
- International Council on Museums Committee for Conservation (ICOM-CC) www.icom-cc.org/;
- Institute of Paper Conservation (IPC) www.ipc.org.uk/.

Some of the larger national associations also organise conferences that attract an international audience, such as:

- American Institute of Conservation (AIC) <http://aic.stanford.edu/>;
- United Kingdom Institute of Conservation (UKIC) www.ukic.org.uk/.

Publications

2.2 Most transfer of knowledge in the conservation field is through a series of specialist journals, newsletters and websites produced by professional associations. There are a large number of these. The peer reviewed journals in the UK are:

- *The Conservator*, published by UKIC;
- *The Paper Conservator*, published by IPC;
- *Studies in Conservation*, published by IIC.

Studies in Conservation carries mainly science-based articles to an international audience while the other publications focus primarily on conservation practice. There are comparable peer-reviewed journals produced by AIC and other national conservation organisations, including those in Italy, Germany, France, Australia, Canada and Japan.

2.3 There is remarkable willingness to share ideas and knowledge within the conservation community fostered by organisations such as the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) www.iccrom.org and that facilitated through Conservation On-Line (Co-OL) and the Cons Distlist <http://palimpsest.stanford.edu/>. The latter is an on-line resource with links to most English language conservation groups.

2.4 Two directories of conservation research in the UK were published by the Museum and Galleries Commission's (MGC, forerunner of MLA) Conservation Unit in 1992 and 1994. There has been no comprehensive publication since then though there have been occasional updates on projects in conservation newsletters. There have also been attempts to identify conservation research needs for particular types of collections eg archaeology, textiles, paper.

2.5 There is an excellent on-line abstract service for conservation literature, *Art and Archaeology Technical Abstracts* (AATA) www.aata.getty.edu. AATA Online is a comprehensive database of over 100,000 abstracts of literature related to the preservation and conservation of material cultural heritage. This service is provided by the Getty Conservation Institute in association with IIC and with ICCROM.

2.6 During the preparation of this response it was reported that UK conservation journals do not rate highly in research assessments and so scientists are more likely to publish in main stream science publications than in the conservation journals. No evidence was presented to support this claim but the sub-committee may wish to investigate further. If this does prove to be true then many conservation practitioners may not be aware of the research because they focus on the literature produced by their own professional bodies and are less familiar with the wider scientific literature.

2.7 Publications produced by the professional associations do not have the circulation or academic credibility of journals such as the *Journal of Archaeological Science*² or *Archaeometry*³. The topics covered by *Archaeometry* include dating methods, artefact studies, mathematical methods, remote sensing techniques, conservation science and the study of man and his environment. The journal is published on behalf of the Research Laboratory for Archaeology and the History of Art, Oxford University, in association with the Gesellschaft für Naturwissenschaftliche Archäologie Archaeometrie and Society for Archaeological Sciences by Blackwell Publishers Ltd.

² http://www.elsevier.com/wps/find/journaldescription.cws_home/622854/description&description produced by Elsevier

³ <http://www.rlaha.ox.ac.uk/archy/archindx.html>

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Institute of Conservation Science

2.8 Conservation scientists in the UK have formed the Institute of Conservation Science www.echn.net/ICS-UK/organisation.aspx and its website is hosted by the European Heritage Cultural Network. It is a forum for communication and collaboration between members and is not a forum for communicating with conservation practitioners. The Institute of Conservation launched a new Conservation Science Group in December 2005 in an effort to promote a more integrated approach to communicating conservation science to conservators.

2.9 Areas where improvement in the transfer of knowledge is needed include:

- To non-museum professionals, such as architects and exhibition designers etc. on the subject of standards and practices appropriate to the storage and exhibition of cultural material. The briefs provided by many commissioning bodies are often poorly detailed in this aspect of the design and the only widely recognised standard is BS 5454 (2000), which refers only to the exhibition and storage of archival material;
- Information about new products and materials that can be safely used in the preservation of cultural heritage objects. An independent body that tests products and communicates the findings, in the same way that the Consumers Association does for domestic products, is probably needed.

Celebrating conservation science

2.10 The Anna Plowden Award for Research and Innovation in Conservation is an initiative of the Anna Plowden Trust. The award is made to the best completed programme of research or development aimed at furthering the practice of conservation. The three short listed projects for the 2005 award⁴ are:

- Monitoring damage to historic tapestries;
- Aesthetic protection for stained glass windows;
- The Pigment Compendium.

3. *Is conservation [science] adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?*

3.1 It is difficult to identify the total amount of funding that goes towards conservation science each year other than through grants made by the funding councils. There does seem to be a decrease in the amount of conservation science work carried out in collecting institutions and increased activity in university departments, which have better facilities and access to funding opportunities. The disadvantage of this situation is that the universities are often isolated from collections, though this can be overcome by close collaboration with the collecting institutions. The work of the Textile Conservation Centre mentioned above is a good example of what can be achieved.

3.2 The creation of the Arts and Humanities Research Council (AHRC) and opening up of partnership funding opportunities to museums is a very welcome development and will hopefully enable some interesting research projects to be carried out.

Conservation science skills base

3.3 In a survey carried out by the MGC in 1998 (*Museum Focus*, (2) 1999, MGC) there were 33 posts working in the field of conservation science in museums, libraries, archives and related organisations in the UK. These were based at the institutions listed below:

Bournemouth University	Royal Armouries, Leeds
British Museum	Tate Gallery
Camberwell College of Arts	National Museums of Scotland
De Montfort University—Leicester	National Museums and Galleries, Merseyside
De Montfort University, Lincoln	National Gallery
English Heritage	University of Northumbria at Newcastle
Historic Royal Palaces Trust	University of Wales College of Cardiff
Historic Scotland Conservation Centre	Victoria & Albert Museum
Hunterian Art Gallery, Glasgow	

3.4 The present figure is probably not significantly different. Posts have been lost at the Science Museum and

⁴ Further information is available at <http://www.consawards.ukic.org.uk/>

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British Museum but new ones have been established at the British Library, The National Archives and in some university departments.

3.5 Until recently, there was a conservation science MSc course offered by Birkbeck College, University of London, though the number of students at any one time was always small. More recently, a place on the RCA/V&A Conservation training programme was allocated to a student specialising in conservation science.

4. *How does the UK compare to other countries in its application of science to conserve cultural heritage?*

4.1 Some countries benefit from having a national centre for conservation that have an international reputation for the high quality of their work. Some good examples are:

Canadian Conservation Institute (CCI): The CCI combines conservation research and publishing professional publications with practical conservation work and specialist training. It is probably the best known and longest established centre, and has a good reputation for communicating the results of its work to the conservation community (<http://www.cci-icc.gc.ca/>).

Coördinatiepunt Nationaal Conserveringsbeleid (CNC): CNC is based in Amsterdam and provides a similar range of services in Holland (<http://www.kb.nl/infolev/cnc/cnc-home.html>).

Istituto Centrale per il Restauro (ICR): Based in Rome, ICR combines conservation teaching, research and practice (<http://www.icr.beniculturali.it/indexj.html>).

Smithsonian Center for Materials Research and Education (SCMRE): SCMRE carries out an independently formulated programme in research and education in the conservation, preservation, technical study and analysis of museum collection items and related material, serving a nationwide and international professional audience. It was formerly the Conservation Analytical Laboratory established to provide technical support to Smithsonian museums (<http://www.si.edu/scmre/>).

Getty Conservation Institute (GCI): The GCI works internationally to advance the field of conservation through scientific research, field projects, education and training, and the dissemination of information in various media (<http://www.getty.edu/conservation/institute>).

Image Permanence Institute (IPI): IPI is a university-based not-for-profit institute dedicated to research for the preservation of visual and other forms of recorded information (<http://www.imagepermanenceinstitute.org/index.html>).

4.2 The establishment of a national conservation centre in the UK was the subject of much debate and lobbying of government during the 1960s, 1970s and 1980s. The MGC's Conservation Unit set up a working party in the early 1990s to consider the matter but it concluded that there was insufficient support from the national museums, where most conservation scientists were employed, to centralise their scientific and research facilities. This may be an opportune time to re-visit this idea of a national conservation centre, particularly to look at the needs of the non-fine art collections such as photographs, ethnography, archaeology and technological collections. A national centre employing a small pool of conservation scientists could be more effective than the same number working in several different institutions.

Examples of international collaboration in conservation science

4.3 The international Infrared and Raman Users' Group (IRUG) is dedicated to the professional development of its members by providing a forum for the exchange of infrared (IR) and Raman spectroscopic information, reference spectra and materials. IRUG is composed primarily of individuals within the art conservation and historic preservation fields who use IR and Raman spectroscopy to study the world's cultural heritage (<http://www.irug.org/>).

4.4 Monitoring damage to historic tapestries: This collaborative project involving seven partners across Europe (including the Textile Conservation Centre, University of Southampton) aims to improve the care and protection of historic tapestries by developing methods of predicting their future conservation needs. Using state of the art analytical techniques, the team studied the damaging effects of ageing in woven tapestries and applied their methods to the analysis of samples from Europe's finest tapestries.

4.5 Cellulose Acetate Microfilm Forum (CAMF): <http://www.bl.uk/services/np/journal/3/camf.html>.

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5. *In what ways can technology contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?*

5.1 Objects exhibited without interpretation are not fulfilling their full potential to inform, educate and inspire the visitor. They also offer an effective way of presenting the underlying principles of science and technology to audiences that may previously have shown little interest in the subject.

5.2 The results of the technical examination of historic artefacts and works of art add another dimension to their interpretation. It can show how an object was made and from what materials; it can demonstrate the level of technological development of the makers and can also provide an insight in what happened to the object during its lifetime. The popularity of this level of interpretation is demonstrated by the prominent role it plays in newspapers and magazines, and the number of television programmes on archaeology, art history and the history of technology.

6. *Is there a scope for improving the use of UK galleries, museums and others make of science, engineering and technology (SET)?*

6.1 UK collections do not make sufficient use of the opportunities to include information from the analysis and technical examination of objects and works of art alongside the exhibits in the galleries. Some of the barriers to this happening are outlined below.

- Exhibition designers are sometimes reluctant to include interpretive material in exhibitions as they feel the objects should “speak for themselves” There is a need for a campaign to demonstrate how innovative approaches to gallery displays that can include SET information.
- Information locked away in an expensive catalogue is not truly accessible to all audiences.
- There are very few simple publications aimed at school children that deal with scientific aspects of conservation science. The MGC publication “In the Nick of Time” deals with this subject and is aimed at children at Key Stage 2 and 3. It is currently out of print but has been digitised and will shortly be posted on the MLA website.
- There is a shortage of suitable support material to help education officers and teachers to incorporate SET when working with collections in museums and galleries. It is also possible that many do not have a science background and find the subject difficult to understand themselves. The provision of training and making available suitable teaching aids would help to address such problems.

6.2 There are many interesting themes that can be explored through the linking of science and conservation. One that should not be ignored is the fascinating history of conservation and conservation science in the UK. This grew out of the realisation after the end of WW1 that collections from the national museums that had been stored in the tunnels of the London Underground system had deteriorated badly. The Board of Trade carried out enquiries and eventually a laboratory was established at the British Museum to investigate the problems. The key figure in subsequent research was Dr Harold Plenderlieth, who wrote a number of key guides to the care of antiquities and works of art. His researches prior to WW2 on the best environment to store objects ensured that the national collections were housed safely, protected from both the threat of bomb damage and poor environmental conditions. His publications laid the foundations for current conservation and collection care practice.

6.3 The media already makes good use of SET in interpreting art, archaeology and science (particularly industrial archaeology). However, this is less well developed in museums and galleries.

7. *What, in the UK and internationally, are the best examples of the use of technology to improve access to and understanding of cultural objects?*

7.1 Good examples in the UK include:

National Museums Liverpool Conservation Centre: The Centre houses the NML’s conservation studios. It is open to the public six days a week, offering tours, exhibitions, publications, interactives and a good website, which explain to the visitor what can happen when science and art meet. A major new exhibition with the working title ‘Reveal’ will open in 2006. This will enable visitors to discover the scientific principles, methods and techniques that enable the staff to understand, treat and interpret the collections. The Centre was European Museum of the Year in 1998 (<http://www.liverpoolmuseums.org.uk/conservation/>).

National Gallery, London: The “Art in the Making” series of exhibitions and associated events.

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The British Library: The “Turning the Pages” project enables visitors (actual and virtual) to view digital images of 13 great manuscripts, including drawings of Leonardo da Vinci, manuscripts of Jane Austen and early Mercator maps (<http://www.bl.uk/onlinegallery/ttp/digitisation4.html>).

The National Archives: The 1901 Census returns for England and Wales are now accessible and searchable on-line (<http://www.1901census.nationalarchives.gov.uk/>).

University of Birmingham: The “Spatial Lab” project on virtually reconstructing a Grecian cup, which allowed for an understanding of materials facilitating conservation and provides a means to view a fragile object in its current and original states (<http://www.iaa.bham.ac.uk/research/opening/main.htm>).

British Museum: The recent Mummy exhibition at the British Museum used CT scans and many other techniques to show what is inside a mummy wrapping. It used many interactives to interest visitor from various backgrounds and levels of interest.

There are numerous examples where conservators carry out work on objects in the open gallery. In some cases the visitors can talk to the conservator about their work but in other cases they are behind glass screens or there is a video link. Most conservators recognise the importance of showing what they do but not all are comfortable working in this way.

Many industrial museums have working exhibits and normally include interpretation material about the associated technology. The Kew Bridge Steam Museum regularly steams several large water pumping engines that were originally used to take water from the Thames filter beds to the reservoirs that provided west London’s domestic water supply. The massive pumps are very impressive and present a very useful practical demonstration of power of steam technology. These exhibits are supported by an exhibition that describes how potable water is produced, distributed and subsequently drained, treated and re-cycled.

7.2 For international examples, the 2003 MLA report *Advocacy of Stewardship on the Web* is a useful overview of international web-based resources that provide advice and information on conservation and contains many interesting examples: (<http://www.mla.gov.uk/documents/id693rep.pdf>).

The author was assisted in this memorandum by:

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Pauline Webb	Museum of Science and Industry, Manchester
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Examination of Witnesses

Witnesses: SIR NEIL COSSONS, Chairman, and MR JOHN FIDLER, Conservation Director, English Heritage; MR CHRIS BATT, Chief Executive, and MR PETER WINSOR, Collections Development Manager, the Museums, Libraries and Archives Council, examined.

Q261 Chairman: Good morning and welcome to the fifth public hearing of the Sub-Committee on Science and Technology Select Committee looking at science and heritage. Thank you very much indeed for coming. For the members of the public who are here there is a short note about the investigation and our declarations of interest, copies of which are sitting on the chairs in the corner there. Do pick one up if it is of interest to you. Can I again welcome the four of you who are here to give evidence. Would you like to introduce yourselves and then if there is anything you would like to say before we go into the questions perhaps you would like to say it briefly now, otherwise we will go straight into the questions. Mr Winsor, would you like to start?

Mr Winsor: Peter Winsor and I am the MLA’s conservation adviser. I have a conservation background. I have a background also with the predecessor organisation to the Museums, Libraries and Archives Council which was the Museums and Galleries Commission. I worked for the Conservation Unit within that Commission for many years.

Mr Batt: My name is Chris Batt and I am the Chief Executive of the Museums, Libraries and Archives Council.

Sir Neil Cossons: I am Neil Cossons, Chairman of English Heritage.

Mr Fidler: I am John Fidler, the Conservation Director of English Heritage.

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Q262 Chairman: Thank you very much. Is there anything that any of you would like to say by way of introduction? If not, we will go straight into the questions. I would like to put to you the issue of how far your organisations feel that conservation science is represented within your strategic priorities, what does conservation science contribute to your work, and what role does each organisation have in promoting conservation science?

Sir Neil Cossons: English Heritage is of course a conservation body and so conservation is at the heart of all that we do. To be an effective conservation body we need to have the quality of scientific understanding of conservation well developed in the organisation. We see conservation as one of our central priorities in terms of the broad philosophy of conservation as it relates to the built environment and then the technical issues associated with the various materials and types of buildings, landscapes and environments with which we deal. John Fidler, on my right, heads the part of English Heritage which is specifically responsible for that and perhaps he would like to pick up the running.

Mr Fidler: The organisation, in the implementation of its first research strategy, has made a central plank of its organisational role to develop a better understanding of the historic environment and its sustainable management, which includes conservation and the science that underpins it. In fact, our corporate strategy, the business plan for the organisation, is premised upon the principle that understanding is key to everything we do. That of course includes what we are talking about here today. Because we are an organisation with many different facets and functions—for example, we own historic sites, we give advice to the Government and to the public and so on—we are very well placed, as some other organisations are in the heritage sector to transfer knowledge from science and research to end users to their benefit. We make a great play of knowledge transfer activities in our work. My Chairman, Sir Neil Cossons, has mentioned our roles in building conservation but we are also a museum authority accredited by the MLA. We have very large archives relating to the historic environment and we have roles to play in the conservation of archaeological finds. So in all these activities, we are constantly trying to promote and use conservation science in its widest form, for example, sponsoring various awards in the field.

Q263 Chairman: And the MLA?

Mr Batt: We are not first and foremost a conservation agency. We have a responsibility to represent the interests of more than 8,000 institutions—museums, libraries and archives—but they all share one very important common theme and that is that they all collect things and therefore the

care and the development of collections is at the heart of everything that we do. We have four strategic aims which summarising very briefly are: increasing participation in those institutions and their collections; developing strategy; modernisation and improvement, raising standards; and advocacy—nationally, locally, and indeed regionally. Our approach works through developing policy options which we will give to Government and other institutions to deliver strategically commissioned programmes. Perhaps the most relevant to the discussions here is the Renaissance in the Regions programme which we are managing. We have just got to the end of the first three years. Over six years it will be an investment in regional museums of round about £150 million. Also, we feel that supporting innovation and gathering and sharing intelligence are absolutely critical to the development of those institutions. If I may just mention a few of the programmes we are involved in, which underline how we are supporting very much on what I would call the demand side. We are looking at the needs within our institutions and trying to meet those needs in terms of the collections, curation, conservation and development. We run the Accreditation Scheme which sets minimum standards for now round about 1,900 museums. We are supporting Renaissance in the Regions, which over six years will put about £24 million directly into collections development. We run the Designation Challenge Scheme, which in the present funding cycle will be putting in about £3.5 million, much of which is into conserving and developing collections. We have developed new techniques for conserving, storing and exploiting the wallpaper collection at the Whitworth Gallery. We have created a new conservation centre with others at the National Tramway Museum and will open a Paper Conservation Centre at the Ashmolean. We have the PRISM Grant Fund, which has funded the purchase and also the conservation of industrial and other scientific works. We have created most significantly a subject specialist network group which looks at a whole different range of museum specialisms and subject interests to try and create networks of sharing. Very lastly we have something which you will have heard from Nick Poole of the MDA where we have started to fund the Collections Link, which is again taking good practice and sharing it across all of those institutions.

Mr Winsor: If I may add that we have tried to incorporate the findings of conservation research into the best practice standards that we have produced and schemes such as the Accreditation Scheme and they specify how we expect collections to be managed and looked after. An example of how that might be operated would be that we insist that all conservation work is carried out by conservers accredited by the Institute of Conservation and listed

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on their Conservation Register. The Institute of Conservation operates a professional accreditation scheme which monitors the standards of conservation practice in this country and throughout that time we have endorsed the work that they have done and supported it and built those sorts of procedures into our standards.

Q264 Chairman: Am I right that the funding of the MLA, just as English Heritage, essentially comes from DCMS?

Mr Batt: Yes the core of our funding comes from the DCMS. We receive funding from the Department for Education and Skills for some programmes also but mainly from the DCMS.

Q265 Chairman: Insofar as you have discussions with DCMS on strategy, how far does the issue of conservation science figure in those discussions?

Mr Batt: It is not significant in particular cases. Clearly if I take Renaissance in the Regions as an example, the discussions about the care and development of collections are crucial so that we will be talking about the overall delivery of a programme which preserves, exploits and exposes collections to more visitors, which has underpinning that the conservation science, but the interest in the programme is very much opening up the collections.

Q266 Chairman: And in relation to English Heritage?

Sir Neil Cossons: We are sponsored by DCMS. Our grant-in-aid comes from there, although as an illustration of the cross-cutting nature of our work I think we are the only non-departmental public body where the funding agreement is signed by three Secretaries of State. Our work with Defra, for example, is very important in the rural environment and so the Secretary of State for that department is a signatory, as is the Secretary of State for Communities and Local Government.

Q267 Chairman: Broadly speaking, English Heritage deals with the immovable heritage and MLA with the moveable heritage, but there are presumably moments when there is a certain fuzziness around that. How far do you see your responsibilities here across both areas?

Mr Batt: We obviously work together. There are specific examples. There was work on standards for archaeological archives, which we jointly prepared, and that has turned now into an Archaeological Archives Forum. We have worked in other areas. We have responded to the strategy that English Heritage produced earlier this year and we see that as an integral part of any work that we do and will continue to behave in those ways.

Q268 Lord Chorley: Can I follow up on that with the MLA. Do you see yourselves as having a responsibility for seeing that standards are being maintained by your clients (let us call them that) in all the museums, and does that extend into the private sector in the shape of, for example, stately homes? I think in English Heritage it does in a sense, does it not, but I am not at all sure that I understand how MLA works in that sense.

Mr Batt: For museums the standard is the Accreditation Scheme which lays down a whole series of requirements in terms of collections care and management, access to collections, the accessibility of buildings and the range of services that must be provided by a museum that is accredited. This is a voluntary standard, but 1,900 (over 80 per cent of England's museums) have achieved the standard since it is accepted as a quality assurance tool recognised by a number of funding bodies.

Q269 Lord Chorley: And the basis is presumably the grant?

Mr Batt: Yes, there are funding institutions which accept a grant application from an accredited museum more at face value than one that is not. It is not a prerequisite but it is certainly a key to unlock the door and to be able to demonstrate that the institution has, for example, the right mechanisms of collection care and development in place and a whole range of other things as well in terms of customer relations and the opportunities to provide learning resources.

Q270 Lord Chorley: What is a collection or a museum? Obviously a type of example is, say, Chatsworth. That is a country house; it has a fantastic collection of everything under the sun. Is that accredited by you?

Mr Winsor: Yes, it is.

Q271 Lord Chorley: So some houses might be; some might not be?

Mr Winsor: Almost all of English Heritage's properties which have collections in them are part of the Accreditation Scheme, as are the National Trust properties, but a lot of privately owned private houses such as Longleat are as well¹. We have some other work that we do with private collections which is through the Conditional Exemptions Scheme and acceptance in lieu where we do set standards for environment and security. I think one other thing that is worth mentioning is that the Conservation Register that is now operated by the Institute of

¹ Correction: There is a distinction between private collections in houses owned by an individual, and those owned by a charitable trust. This means that Longleat is not in fact part of the Accreditation Scheme since it is in the ownership of an individual while, for example, Harewood House is owned by a trust, and is accredited.

Conservation was established by the MLA's predecessor organisation, the Museums and Galleries Commission. That is one way of ensuring that high standards of conservation practice are available and practitioners who operate to the high standards are available to the museums, libraries and archives but also to the private owners.

Lord Chorley: Thank you, that is helpful.

Q272 Lord Young of Graffham: Does your work cover university collections?

Mr Winsor: Yes.

Q273 Lord Young of Graffham: It does, so you take a direct interest in the collections—declaring an interest I am part of UCL—in the collections that we would have?

Mr Winsor: The Fitzwilliam, all of them.

Lord Young of Graffham: The Fitzwilliam and the others, thank you.

Q274 Baroness Hilton of Eggardon: I was wondering about valuable collections in private hands which you know are crumbling away. Do you have any responsibility at all for things which are not accredited where people are not trying to get grants but where you know that library books are all being eaten away by dust and mites and whatever else eats library books?

Mr Winsor: I think we can do very little directly for that except that we and a lot of other organisations have produced advice and guidance on the care and management of collections, and we have recently funded the Museums Documentation Association to create something called Collections Link which is putting a lot of this advice, guidance and information on to an on-line website and an advisory service associated with that. This is done in partnership with the National Preservation Office, the British Library, The National Archives, the Institute of Conservation, and quite a few other organisations.

Q275 Baroness Hilton of Eggardon: I am worried about owners who perhaps do not have the means or the inclination to look after what they have. Do you feel any sense of responsibility for those?

Sir Neil Cossons: In our case of course it is slightly different because a large part of the historic environment is privately owned. Most listed buildings are privately owned. Society has an interest in the well-being of those buildings so to the extent they have been designated as historically architecturally important we take an interest in them from that point of view. We publish annually a Buildings at Risk register which identifies the 1,400 or so of real importance which are threatened. Each year some will disappear from that list, usually because they have been properly conserved, rarely

because they fall down, but of course a few more are added. It is a very useful means of monitoring—or doing a health check, if you like—on the key historic buildings in the country. By the same token, there is an annual survey which is an annual audit of the historic environment which we publish on behalf of the whole historic environment sector. That is called *Heritage Counts* and last year its theme was the rural environment. That pointed repeatedly to conservation issues to do with the well-being of the historic environment of the countryside. Each year we take a theme that enables us to pinpoint particular issues of concern in the historical environment.

Mr Batt: If I may just add one point. There clearly are limits because there are still collections that are discovered after somebody dies or something like that, and that is not simply libraries but archival records and works of art as well, and you can only do so much to try and identify them. We are a regionally based agency as well as national and there are times when we can discover things, but clearly if somebody does not want something discovered, it is quite difficult for us to take much action.

Mr Fidler: Where the building is one of the finest objects in the collection, together with the objects it contains, and there is financial stress, the Secretary of State allows English Heritage to acquire properties as a last resort. Brodsworth near Doncaster is a case in point. When I first visited, Ming vases were being used to collect rainwater dripping from the roof. We were able to work with the owners and local authorities to assemble a package whereby we could take the building into care and conserve the artefacts and the building.

Q276 Chairman: One final question: how far is scientific expertise, either specifically conservation science or any other scientific expertise, represented on either of the two boards?

Mr Fidler: English Heritage has a “full-time equivalent” research workforce of about 50 staff. I use this term because they are not working on science or research all the time, they have various other functions. Part of the workload that relates to research is based on SETI activities but also on giving advice and setting standards in these fields, too. We supplement our internal resources with about 200 external partners, contractors and collaborators to expand our influence and our activities.

Q277 Chairman: But are you represented at board level by anybody who is a conservation scientist or a scientist of any sort?

Sir Neil Cossons: This would be at English Heritage commissioner level. We do not have specific scientific representation but we have leading archaeologists and historic buildings experts amongst the commissioners. All three of them are well plugged

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into the broader issues of the science of archaeology in its broadest context, not just conservation science, and they also appreciate the importance of science in historic building conservation, but they are not scientists as such.

Mr Batt: We do not have anybody who is a scientist themselves but we have on our board of trustees the Chief Executive of the British Library, who heads a conservation team, the Director of the British Museum, and a senior representative of The National Archives, so there is the opportunity to get through to the resources that they have.

Q278 Lord Paul: That brings me nicely to the question that I was going to ask. To what extent do English Heritage and the MLA co-operate in establishing priorities for conservation research?

Mr Batt: I mentioned already that we responded very favourably to the methodology, the contents and the presentation of English Heritage's strategy that they published earlier and we have said that we will ensure in the development of our own research and evidence strategy that we will make sure that there is strong read-across. It is worth remembering, I think, picking up some of the points that have come up earlier, that over 60 per cent of the museum collections that we have an interest in and are responsible for are in historic buildings, so there is in a sense a strong relationship there. I think that there is a developing set of relationships that could emerge from the seminar that English Heritage ran earlier this year which, as I understand it, is proposing some research clusters to see how we can get those to read across and to work with the subject specialist networks that we have created. Those are subject related but it does seem to me that there ought to be ways in which we can ensure that there is a strong connection between those two sets of groups of people who are working some more towards the scientific end and some towards the care of the collections, the conservation and the access to them. We will continue to put significant funds into collections care and that in itself runs if not very closely to English Heritage and some of the work they are doing at least in parallel, to demonstrate that we believe passionately about collections, both in terms of the access to them, but also in terms of ensuring that they are cared for and looked after in a way that is appropriate.

Sir Neil Cossons: In the case of English Heritage I think Chris Batt has mentioned the relationship of the MLA to ourselves when it came to the development of our own strategic plan and research strategy. I think that element of co-operation has illustrated to us the opportunity for it to go a lot further. I think there is a huge amount to be gained from our working together, accepting that there are areas of overlap—moveable objects—which are typically the province of museums and galleries, but

by the same token we have got our own areas of specific expertise. There are also some real pressure points. If one recognises that Planning Policy Guidance 16, which is the regulation within which excavations are carried out in advance of development, is typically conducted either by English Heritage or agents of English Heritage, of course they produce finds—prolific volumes of research archaeological material—which of course end up in museums. Museums are not funded to look after them and we are not in the business of taking them in and looking after them either. So our reading of the bigger picture of conservation in this area of historic environment—museums and collections—is that there are organisations with high-quality expertise and knowledge within their own areas, and that where we can probably work together more effectively is in some overarching strategic approach to define what those areas are and then doing well the particular things for which we are well qualified, working closely then with other organisations which have other skills which we would not have and would not expect to have. There are plenty of examples of that.

Q279 Lord Paul: English Heritage has statutory duties with respect to listed buildings, planning and so on. It is also a significant property holder. How does it define the limits of its responsibilities? Is it responsible for only the best historic buildings, or more widely for the good maintenance of the built heritage? How does it exercise effective control over development that could threaten the historic environment?

Sir Neil Cossons: That is a very big question. We have a number of functions but three primary ones: we are the principal adviser to Government on the historic environment; we offer grants to owners in support of the conservation of historic buildings; and we open 420 sites and buildings to the public as an owner of historic and other properties. In the context of conservation, conservation science underpins all three of those. It enables us to take a more responsible and defined approach in relationship to designation, for example. It enables us to advise owners on care of their own properties. It is that same source of advice/guidance for the way in which we look after our own properties. Some of our properties can be exemplars to others when it comes to conservation and so on. But, as I said just now, most of the historic environment is in private ownership and always will be, so the interface between ourselves as a part of government and the private owner is a subtle and complex one. We are moving progressively, and I hope successfully, from what in the past has been a rather adversarial relationship between English Heritage and its predecessor body and the private owners to what we would see as a

much more productive relationship to secure the future of historic buildings and being able to draw upon expertise from within English Heritage, particularly from scientific and conservation experts, we believe what we happen to have at the core of the organisation is crucial to our being able to have that sort of productive relationship with private owners.

Mr Fidler: We are also conscious that a great deal of responsibility is vested in local planning authorities in relation to the historic built environment, and that their resources have been stretched in various ways. We have helped to study those stresses in local government. We have programmes to build capacity and competence there too, so support for owners and support for local government is part of our strategic plan, and for the professionals in local government we produce text books based on our research. For example, the English Heritage book I am holding up for you to see is concerned with timber decay in buildings and is based on some studies of deathwatch beetle decay around Westminster Hall and other buildings of great note. For owners with more modest historic buildings, we provide simpler technical guidance such as our new publication, *Period house*, on how to maintain and look after their properties. Again we cascade down our scientific research into these documents.

Q280 *Lord Young of Graffham:* Could I come back, Sir Neil, to an earlier answer you gave about the responsibility English Heritage has when sites are being excavated and artefacts of archaeological interest are found. Who has the ownership of those artefacts and what responsibility do the owners have towards them?

Mr Fidler: It depends on the contract established through the excavation. Many developers for the last 15 years or so, have entered willingly and freely into contractual arrangements with the local authority and with the museum authorities to undertake best practice in the excavation of archaeological materials, the publication of reports, and so on. Most of this protocol was enshrined in an agreement between the local authorities, ourselves and the British Property Federation in the past, and the regulatory vehicle to drive this is Planning Policy Guidance Note 16 (Nov 1990). The direct answer to your question is that the finds end up in two or three different ownerships at the end of the day. Most of them are gifted by the developer, other funders or archaeological units to museums, and the problem we see is that the resources devoted from the property sector to archaeology in its widest sense need in some way to be rebalanced to account for the long-term care and storage of the finds.

Mr Batt: It is often an unwanted burden for museums, of course, because the accident of a large amount of development in archaeological sites within

the catchment area of the museum can produce huge volumes of material which they are not able to anticipate nor are they necessarily equipped to house.

Q281 *Lord Young of Graffham:* I fear I am old enough to remember a time when the Legal & General were developing underneath the City and came across the Temple of Mithras which held up the development but then they took it and rebuilt it outside. To my knowledge, nobody has paid the slightest bit of attention to it having being rebuilt because it is no longer genuine in that sense. Would that happen today?

Mr Fidler: Less so in that particular case because part of the site was scheduled as an ancient monument and so we currently have some responsibility for oversight. I used to be the Historic Buildings Architect for the City so I know this quite well. The corporation did have a maintenance function which unfortunately has been neglected in recent years. However there is a good ending to this particular story, because the site is about to be redeveloped yet again (the pace of development being what it is in the City) and we have been working in advance of planning applications with the developers to negotiate further excavations of parts of the temple which were previously unknown to try and assemble a better presentation of the site, and developers are a willing party to this objective.

Sir Neil Cossons: The Rose Theatre is another good example.

Q282 *Lord Paul:* What are the statutory duties of the MLA and where do you see the opportunities to support conservation and conservation science?

Mr Batt: Statutory duties are something that we do not really have directly. We have responsibility passed to us from the Department for Culture, Media and Sport to oversee the performance of public libraries, which are a statutory service, so we manage the standards and the assessment of performance and things like that. The other programmes that we have are strategically commissioned where they are parcelling money to us to deliver for example Renaissance in the Regions or programmes that we have put in place like the Accreditation Scheme, which are voluntary but because they have demonstrated success are taken up by most institutions.

Q283 *Chairman:* Can I take up one issue. You have talked about building capacity at a local government level and you have talked about Renaissance in the Regions and working with local museums. Is there a problem at local government level in terms of the squeeze on local funding and therefore, to some extent, archives and collections being a non-statutory

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duty for local government they have tended to cut back on these activities?

Mr Batt: There are always difficulties with local government funding because there are many demands on their resources, but it is a mixed picture and at the same time as some collections are under stress other collections are developing. If you look at the growth cities at the moment, while there are some museums where they are working hard to maintain their current position, if you look in Liverpool for example, there is a real blossoming of museums and development of services as part of the City of Culture 2008 and other things going on there. So it is a mixed picture and what we need to do is to take strength from where there are developments and work collectively with policy-makers and politicians at local and regional level to ensure that they see the real value in doing these cultural developments.

Mr Winsor: Concern for under-funding of the regional museums was one of the big drivers for the Renaissance in the Regions programme. From that research they did in the early part of this millennium, a huge amount of funding—and Chris will give you the exact figures—has gone into regional museums and also through the Designation Challenge Fund. This made a huge increase in capacity through developing new curatorial posts, new storage resources and new conservation facilities as well. It has been a great success but this has been ring-fenced funding through the DCMS.

Mr Batt: Part of the responsibility for those museums that formed the hub that are at the heart of the Renaissance in the Regions programme is that they make their funding commitments for the three-year funding cycle of the programme. We get concerned and if they feel there are pressures on the budget we would want to make sure they understand the finance comes with a very strong *quid pro quo* that they need to maintain their funding levels.

Q284 Baroness Hilton of Eggardon: At the moment there is no overall strategy for conservation science and research. Do you think it would be useful to have such an overall strategy? If so, who would you think should be setting it? Should it be DCMS or yourselves combined? Where would such a strategy be developed?

Sir Neil Cossons: We certainly think that there should be an overarching strategy for a number of reasons. Firstly, there are already a number of centres of excellence and we think anything that enabled them to work more closely and effectively together and to have their qualities reinforced would be good. Equally, there will be gaps which might need to be filled and a strategy would help to see that. The second part of your question is much more difficult to answer partly because we are dealing in the case of English Heritage with a body which only deals with

England. We have equivalent bodies north of the border in Historic Scotland and west of another border in the form of Cadw and of course good relationships with the historic buildings conservation agency in Northern Ireland as well. We do a lot of sharing between those four organisations. In the case of conservation in the built environment, we have offered to our partners in the other home countries the potential for English Heritage to co-ordinate and provide a secretariat for some sort of improved co-ordination there. Not in any way to rule the roost, you understand, but simply for us to be able to work more effectively as partners. My feeling is that it would be useful to see that partnership go into the area of moveable objects, typically the sorts of things that are the responsibility of museums, because the overlaps both in terms of science and scientific expertise are considerable, so perhaps—and this is thinking aloud—the best means of co-ordinating it might well be for the key players in the various fields of expertise, whether it is paper conservation at one end of the British Library, or the bricks and stone at the other with ourselves, to form some form of liaison group specifically for the purposes of the strategy. It is difficult to see it moved one level up to a particular government department because of the issues of the four home countries, whereas we have already got co-operation at the agency level and working with MLA and others we could see a good network develop.

Mr Fidler: We also think that the research councils have a role to play in this, too, and our signing of a concordat with the Arts and Humanities Research Council has opened up access in a formal way to Research Councils UK. Particularly with EPSRC and ESRC, we formed a partnership to develop multi-disciplinary cross-council thinking in relation to the historic environment—in its widest sense both moveable and immovable heritage—and I think that will be very fruitful for us and the end users of research, as Neil said. With the applied end of research and the research councils' interests it could be quite a powerful vehicle to create a unified framework or an overlapping set of strategies where we could share best practice and share costs for the common good.

Q285 Baroness Hilton of Eggardon: It is very difficult to get the Scots on board I should think. They are very suspicious, presumably, of English Heritage?

Mr Fidler: Our opposite numbers are very keen to follow us. The Chief Scientist in Government was extremely helpful to English Heritage in helping us to develop our own research strategy. Our friends across the borders are really only just starting to develop their own research strategies and, quite naturally, they want to sort out what they themselves want in their own backyards before having a dialogue with us about what broader common ground might

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be. We are very hopeful that this dialogue will go forward. Our chief executives meet regularly now and have reinforced the desire for us all to move forward on this. But it will take a little time as Cadw, Historic Scotland and the Environment and Heritage Service in Belfast need to pull together their own strategies first based on the model that OST has provided.

Q286 Baroness Hilton of Eggardon: OST has suggested that there should be a scientific adviser in DCMS. Do you think that would be helpful?

Mr Fidler: We helped the Chief Scientist's office to review DCMS activities in research and science, and that suggestion was also one of our recommendations to the Department. To be fair to DCMS, its interests have really been focused on socio-economic evidence for policy direction and it has relied upon its devolved agencies to have the first port of call for science. So within English Heritage we have a chief scientist. He meets with other chief scientists in environmental fora such as with English Nature, as it has been called to date: Natural England in future. We do lack a little bit of connection with chief scientists in the rest of government through our department, it is fair to say. But we are operating in a different silo of government with DCMS compared to other main ministries. Most of DCMS's work is devolved to its agencies.

Q287 Baroness Hilton of Eggardon: Rumour has it that they are looking for social scientists rather than a hard scientist. I would have thought in relation to conservation science that is not what you want.

Mr Fidler: DCMS has a very broad remit to cover, as we do. We have social scientists and economists working for us too. Our research strategy is about all forms of research and especially the arts and humanities, so it is a rather difficult call to decide what kinds of senior expertise you need round the table. We are hopeful that if DCMS do hire an economist or a social scientist then their disciplinary background will help us to interface with the department and other agencies.

Sir Neil Cossons: If DCMS were to have a more important role in helping to co-ordinate conservation agencies in terms of their scientific work, then I think they do need a hard scientist.

Q288 Baroness Hilton of Eggardon: Indeed, yes. MLA?

Mr Winsor: Obviously an overall strategic framework of all conservation science would be an advantage, and I think most of this has been spelt out by my colleagues from English Heritage. From the moveable heritage, which is our main concern, I think that you cannot under-estimate the diversity of what goes on in museums, what they collect, the size of the institutions, the nature of the collections, and

the scale of their operations. They range from the British Museum, which is collecting huge quantities and has major resources, to very small volunteer-run museums which have almost no resources other than what they can generate from income. Providing support for the smaller organisations is very difficult. We believe that any strategy for conservation science would be best developed by collaboration and discussions amongst the interested parties. We think it is less easy for an individual organisation to take the lead. It would have to come out of the research community which is active at the moment. I think the British Library made some reference to a meeting at West Dean College late last year where a number of conservation managers met together, I think from English Heritage, the British Library and the British Museum, to discuss conservation science. I think that is the beginnings of a consensus of finding a way forward for how we address conservation science and develop an overarching strategy. However, this was only a small group. You mentioned the problems that devolution caused for communicating, certainly with Wales and Scotland. It did create a hiccup but we are now having better communications with the organisations—the Scottish Museums Council and CyMAL—over the border. I do see that any strategy has to be a UK-wide strategy rather than an England-wide strategy. There are a couple of models which we could adopt for developing a national strategy, and perhaps one is the Digital Preservation Coalition which certainly MLA, the British Library and the National Archives are all members of, looking at one issue of preservation. Another would be the Common Information Environment. Just as two examples.

Q289 Lord Chorley: Continuing on the research agenda front—and this is principally addressed to English Heritage—you produced a research strategy in 2005. Who were the main contributors to it? Following on from that as a supplementary question, what were the sorts of challenges that emerged in bringing them together and bringing the strategy together and how has it all worked out?

Mr Fidler: I am responsible for the development of the research strategy. To clarify what we have done: this is a strategy for English Heritage to support its own business. So, very much on the models developed by the Chief Scientist in government, we set out to produce a research strategy that underpins our corporate strategic plan and addresses the main threats and opportunities confronting the historic environment, and the main priorities of our business for the next five years. It was developed within our own organisation in a discourse between our own internal research community with its advisers, and the end users of research, that is our internal client groups, who interface with the public in grants

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programmes and advise the public, and work on our own sites and buildings.

Q290 Lord Chorley: I am sorry, I do not want to interrupt you but you did not, for example, get university academic researchers involved in drawing up this strategy?

Mr Fidler: Not at its start, sir, but what we have is a Research Advisory Panel which is a standing committee of the organisation and it delivers the independent scientific advice that OST require of government departments and agencies. On that panel are eminent scientists in the field, such as Dr Mark Pollard who, I understand has been to give evidence previously to this committee. He is one of the independent advisers and Professor of Archaeological Science at Oxford. Having drafted our research strategy, we then put it out for formal public consultation to see what the sector and others thought of what we are intending to do. We have submitted copies to each university vice chancellor and received some very supportive comments. This week I believe, we are formally publishing the results of our research strategy consultation on our web site². In the main the public has been supportive of our plans for the future, we now want to use our own research strategy as a catalyst to engage with others to shape a UK-wide framework. In terms of the different segments of research interest, those interested in social and economic studies are already coalescing around the Heritage Lottery Fund. It runs a forum called UKHERG, the UK Historic Environment (Socio-economic) Research Group, and it involves most of the agencies and government departments with environmental portfolios that are interested in socio-economic studies. UKHERG has produced a socio-economic research strategy (ie a *A framework for Policy Research*, Oct 2005).

Q291 Lord Chorley: This is within HLF?

Mr Fidler: Yes, within HLF and that now locks onto our own research strategy and I have brought along a copy of the document for you to see. So we are starting to build a jigsaw puzzle or structure of building blocks towards a UK-wide strategy. We have the socio-economic input from a group of agencies. We have got a rather more general strategy of our own and we hope to build these together with others to see where common areas are for a UK-wide strategy.

Q292 Lord Chorley: You say a UK-wide strategy. Are you just adding on Scotland and Wales or is it to say within England there are various elements of ministry powers and constituents who are not part of EH?

² <http://www.english-heritage.org.uk/upload/pdf/Summary-responses.pdf>

Mr Fidler: We have a very wide constituency of interest in our work. The Historic Environment Review Group (HERG, as it is known) involves the National Trust and other agencies and organisations such as the Historic Houses Association, the Country Landowners' Association and others. Again, we asked for a peer review from these bodies on what we are doing. The reason for suggesting that there ought to be a UK-wide strategy is because we have common interests across the geo-political borders. For example, climate change impacts on the historic environment and socio-economic changes in urban and rural areas are also affecting the historic environment. It did not make sense to us to limit ourselves to the borders of England when we have so many common interests with our friends across the borders.

Q293 Lord Chorley: This is how you involve private owners? The National Trust is obviously rather different. I mentioned Chatsworth in a completely different context but that is how they would have been involved in this document?

Mr Fidler: Yes, we did consult with the major bodies representing such interests in the sector including the Historic Houses Association.

Q294 Lord Chorley: HHA, sure, yes. What about the other funding bodies such as Leverhulme? They are part of your network, are they?

Mr Fidler: They are part of our network. We did not actually get a response from them directly on our research strategy. However, as part of our dialogue with the research councils we are now planning to go and talk specifically to the other large funding institutions including the Leverhulme, which has done a great deal of multi-disciplinary funding for heritage.

Q295 Lord Chorley: Would people like Mellon and some of the American ones be included?

Mr Fidler: Yes.

Q296 Lord Chorley: They would be in your network?

Mr Fidler: Yes, absolutely. We have a wider ambition than just a UK-wide research strategy, which is to have a dialogue with our friends in Europe. Our Chief Executive ran a conference for Member State heritage bodies two weeks ago, the first time that they had ever met, and we put on the table the idea of assembling strategic information about our businesses with which to influence the bureaucrats in the EU in Brussels and hopefully get a slice of the cake from the very significant European funding for research.

Lord Chorley: Thank you.

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Q297 Lord Young of Graffham: We have mentioned on two or three occasions now your relationship with the research councils. A few weeks ago you held a conference in Birmingham, did you not, *Preserving the Past*, I think it was called? What was the real outcome of that?

Mr Fidler: It was a very successful event and consulting with my colleagues in the research councils yesterday they did confirm that it was the first time this form of multidisciplinary cross council activity had ever been attempted. So it was a real first and we are very proud to have been involved. The call for attendance at the conference was heavily over-subscribed by five or six times so that was very pleasing. About 120 people met with the Research Councils (AHRC, EPSRC, ESRC and NERC) and English Heritage from a very broad constituency in academia. We also invited our colleagues in Historic Scotland, Cadw and DoE Northern Ireland to come to be with us plus the two Royal Commissions on Historic Monuments in Wales and Scotland, and the National Trust was also invited. It was a very productive two days, looking at the threats and opportunities confronting the historic environment and common ground for multi-disciplinary cross-council research. During the workshops I was particularly careful to not mention our own published research strategy. We wanted the academics present, many of whom were not very familiar with our working, to come to their own conclusions with one another. I am happy to say that many of the primary issues that we see confronting our own business came to the fore in discussions. So five research clusters are being developed out of this work: including ones on sustainability, as you might expect; on the impact of climate change on the historic environment; on engagement and interpretation, which relates to our interest in access to the historic environment; one on values, in their widest sense including social and economic values; and one on integrated methodologies. EPSRC is taking the lead, because of its infrastructure and size, in setting up a call for research networks to be developed under these themes and applications from universities are now starting to come in. What was most interesting about the workshop for me, was that researchers from different departments at the same universities who never spoke to one another were appearing and finding common interests in historic environment research, saying, "I didn't know you were doing this!" So it was a very exciting, dynamic occasion and we are hopeful that it can be developed and run again. One disappointment for us, however, was that our friends in the Natural Environment Research Council withdrew their funding for the support of these research clusters at the last minute, which was rather sad. We very much want to encourage other research councils, notably BBSRC

to also take an interest because we feel that the historic environment within their remit is also of scientific potential. We hope within a month's time that we will be able to assess the winners from these networking activities. They will then be funded jointly by English Heritage and the Research Councils for the development of the networks over the next 12 months, by which time we are hoping that we will be able to allow these networks to apply for directed or responsive mode funding from the Research Councils and ourselves for concerted pieces of work.

Q298 Lord Young of Graffham: So it is going to be a way of co-ordinating the funding from disparate research councils on to common aims?

Mr Fidler: Exactly, joined-up government!

Q299 Lord Young of Graffham: That is unique.

Mr Winsor: From the MLA's point of view we were very interested to hear of this development and receive the papers from the meeting in Birmingham. We think that there is some potential for collaboration with the subject specialist networks that we are developing through the Renaissance in the Regions programme. We will pass on information about this to them and we look forward to some co-operation in the future.

Q300 Chairman: Do you know why the NERC pulled out?

Mr Fidler: It has not really been made plain to us. I suspect that they did not think what was likely to come out of this work was going to be of specific interest to their current stream of themed funding. We are making representations to NERC about this because they are currently in charge of archaeological science, for example, so there is a direct relationship to our activities. Its withdrawal was a disappointment and at the last minute we all had to find additional funding for the networks to thrive in order to continue the programme.

Chairman: To make good the gap.

Q301 Lord Young of Graffham: I suggest you put up the price of the tickets next time!

Sir Neil Cossons: Scientific capacity in DCMS, to pick up the earlier point, is rather wider than the straightforward scientific conservation one because DCMS is of course the sponsor of two major scientific institutions, the Natural History Museum and the National Museum of Science and Industry, and to have scientific expertise at a senior level within the department could, I think, penetrate into a wide variety of the sponsored bodies' activities right across the board, conservation being one of them. I think if the DCMS is to be an efficient buyer of science, it needs to have somebody on the inside who knows

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where to buy it as a commissioner of expertise, so to speak.

Q302 Chairman: I understand that. Can I turn now to the issue of research and how much your two organisations are spending on research as a whole. In the evidence English Heritage gave us you cited in paragraph 2.3 the sum of £9.8 million or 6 per cent of your total budget. We would like to get some idea of how much of that goes on conservation science and to what extent the kind of research commissioned by English Heritage or the MLA fits into an overall pattern of research across the various research communities. It picks up very much what you have been doing with the research councils here and trying to create these networks.

Sir Neil Cossons: Conservation science is about £1.6 million within that larger figure. John, do you want to flesh that out?

Mr Fidler: We are currently in the process of reviewing our pie diagrams for our forward look at funding research and rebalancing our resources. Some of the representations made to your Committee were fearful that we might reduce the amount of money devoted to conservation science because we make (very fairly) a point in our research strategy that we intend to invest more than we have in the past on socio-economic research to provide the evidence base for government. I want to assure the Committee and our audience here today that that is not the case. The amount of money for conservation science is not threatened in any way. In fact, over the last four years we have increased it by three-fold. How we link our resources to the outside world's research plans is really through interfaces such as nCRISP, the Construction Research and Innovation Statutory Panel, that is driven by the built environment and construction industries and relates to the DTI's Construction Support Unit's activities with the construction minister. Information from nCRISP goes to the Strategic Forum which is devising information networks and research activities for the construction industry as a whole. nCRISP has produced a series of policy research papers and is building towards a national strategy, or platforms, for construction research as a whole. We and Historic Scotland have participated in producing a conservation, repair maintenance and improvement (CRMI) component of that national construction research strategy. It is to be published in July on the nCRISP web site.

Q303 Chairman: How about the moveable heritage?

Mr Batt: I suppose I have two points to offer you. Our definition of research is rather different. We do not focus specifically on scientific research. The second is that I have got three figures for you just to give an indication that we cover quite a wide

landscape. We have a research and development budget, which covers both research and development, but mainly action research, and innovation in museums and libraries and archives, and that is about £1.7 million a year. We have a number of programmes, some of which I have mentioned, which deal with conservation-related activities that will not necessarily be conservation science but work to do with the conservation, the storage, and the preservation of collections—things like the Designation Challenge Fund, the subject specialist networks, the PRISM Fund—and all of that adds up to about £2.3 million a year. We have tried to tease out from those two figures what we believe is conservation-related research but not necessarily conservation science, and that is probably about £0.5 million a year.

Chairman: Thank you very much. Lord Paul?

Q304 Lord Paul: The MLA is currently developing a “Research and Evidence Strategy”. Can you tell us what this strategy is intended to achieve in the field of moveable heritage?

Mr Batt: The current work that we are doing is quite an urgent piece of work. The Committee may be aware that the MLA has just re-created itself in its regional agencies as a partnership. That is 10 organisations working around one shared corporate plan with integrated boards of trustees, so that there is closer working and a much stronger sense of direction. The first piece of strategic development is to put together a research and evidence framework which will address four elements to deliver that corporate plan. The first is to produce a retrospective database of research already done, both across the 10 organisations and also other relevant research. The second is to produce for the 10 organisations to work together a set of methodologies and mechanisms of co-ordination to ensure that when work is done it is relevant across the whole of England. The third part of it is to look specifically at research related to impact assessment. There is a very practical reason for that because we are all in the middle of the Comprehensive Spending Review process and we need to pull together the evidence of impact to demonstrate the effectiveness of the whole of our sector. The fourth part, which touches on much of what has been talked about this morning, is identifying the linking networks to other research networks and organisations, which with our regional hats on would be, for example, regional cultural consortia, certainly at national level the various funding councils, and HEFCE itself in some areas of development. It is the “Whitehall village” and it includes other departments to ensure that we are aware of what they are doing and they are aware of what we are doing and specialist groups, for example other organisations which are brother and sister

NDPBs, and the Institute of Conservation is another example. That first stage of the strategy will do no more than that. Thus it is not going to solve the question that you are asking to deal with the conservation of the moveable heritage, or only in so much as it gives us the mechanisms for moving forward on that.

Q305 Lord Paul: Your website says that you are trying to become an evidence-based organisation. What does “evidence” mean in all this?

Mr Batt: It means a range of things. At the basic level it is data so it is numbers to show that the number of kids going to learning activities in museums is increasing and there is satisfaction that they have learnt things which are useful to their education, and all those sorts of things. Evidence is also about taking all of the information we have to do with the Accreditation Scheme and understanding the overall condition of collections and the importance of those collections. That is true of the Designation Challenge Fund and the Designation Scheme as well. It is being able to tell a story about the condition and value which can help both the policy-makers and politicians, who are interested in where our institutions are now and where they should be going, but also the people that use those institutions, and also to encourage more people to use the collections because by studying the patterns of use we can identify where perhaps particular sections of the community are not making use of the collections because it is not presented in the right way, for example.

Q306 Lord Paul: Will it include the evidence from conservation or conservation science research?

Mr Batt: Of course it will, yes. A part of it has to be to understand how we can preserve and develop the collections. What I said at the beginning is that I suppose we are on the demand side. There are the collections, something needs to be done, and often it is about identifying a problem and then looking around for a solution. The most obvious example in my mind (because I was there last Friday and Neil was there last Thursday) is *SS Great Britain* where there was clearly a very serious problem which required some imaginative thinking, the identification of particular scientific skills, which has produced a very elegant solution. It may be quite an expensive solution but it is actually a very dramatic piece of theatre because you can go and inhabit the underside of the ship that is being protected. What we would want to do from that is show to other people who might have similar problems, the whole methodology already used elsewhere, in this case by the *SS Great Britain*. That is something that we can spread. So it is at that end of the spectrum that we work, but we want to build the bridges across to all

of the organisations involved in scientific research to ensure that we can bring as much strength and enthusiasm to bear on those sorts of problems.

Q307 Chairman: In the web site that you have set up—and you have described the national evidence framework—you list seven themes.

Mr Batt: Do we?

Q308 Chairman: Conservation or conservation research is not one of the themes that is mentioned.

Mr Batt: You have the advantage over me because I cannot remember what the themes are, but I am sure there must be something there to do with collections.

Q309 Chairman: Yes, indeed there is. “Collections and services: data covering issue figures, documents produced, collection types, outreach and education.”

Mr Batt: Within that there will certainly be a strand of work which is associated with conservation and the read across I have talked about. We have a very broad tapestry of activity and we have to brigade it in ways that bring a number of things together, but I can assure you that that strand of conservation is important to us.

Q310 Chairman: What I think comes through from what you have been saying is that the Government emphasis on access to which all of are you subject does mean that you are looking very hard, I take it, at this whole question of how can we broaden out access to our collections or our monuments and bring more people in?

Mr Batt: Yes, but our point of departure is that without collections that are preserved and cared for, then there is nothing to come and see or we are in a position where they are going to decay, so it is about balancing between the preservation of them and the access.

Sir Neil Cossons: Having said that, the preservation itself as a process is something in which there is intense public interest. Chris mentioned the *SS Great Britain*. If you think of the *Mary Rose* it is one of the largest artefact conservation projects in the world. It has been going for many years and will continue for many more. At least as interesting is the conservation of the hull and the provision of the new building to house it and so on. You can repeat that in almost every area of museums and historic sites, whether it is the well-known propensity of the British public who want to know what is going on in a hole in the ground (which is one of the great attractions from the point of view of excavation) to the laboratory treatment that the artefacts that come out of that hole will undergo. I think that is quite a powerful means of emphasising the scientific point that lies behind a lot of the work that Chris and his associates and others are engaged in.

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Q311 Chairman: Only last week we were in Rome and Florence. When we went to look at David and talk to them about the conservation on the David statue, they were saying they have done it in situ with the general public going around and what enormous interest this had stimulated in the whole process.

Mr Winsor: English Heritage and the Museum, Libraries and Archives Council have been long time supporters of the Conservation Award Scheme which is to promote public interest in conservation and events such as you describe.

Q312 Baroness Hilton of Eggardon: Could I pursue the MLA's relationship with other organisations. How do you link up with the national museums and galleries? Do you have regular day-to-day contact with them or not?

Mr Batt: At a number of levels. At the collective level—if I can describe the national museums and galleries in that way—through the National Museums Directors' Conference in the beginning of 2004 we worked with them to prepare the Manifesto for Museums. That was the result of the creation of a Joint Advocacy Group particularly focused on the previous spending review. I think that manifesto was a great success in demonstrating the shared opportunities in museums of all types working together. That Joint Advocacy Group has continued to meet regularly. They are now working strongly together on the next spending review. Indeed, we have extended the remit to work with the Arts Council to look at the whole cultural impact. We also work, of course, with a number of national museums on a one-to-one basis, and perhaps the best example of that is our relationship with the British Museum for the Portable Antiquities Scheme, a scheme where there is a reporting structure for significant resources or finds officers to record and document the objects that metal detectorists find. That is an interesting example because one of the tasks that has been necessary is not to ensure that the conservation work is carried out by the British Museum (which receives some of this wonderful treasure that is found from time to time) and it is cared for properly, but actually providing conservation guidance to members of the public for the material they are digging up. It points out that it is probably not appropriate to start cleaning things with Brasso when they take it out of the ground. That whole learning process in terms of conservation can be a very practical one. In other areas, if you take for example the 24 Hour Museum, the web site portal that we sponsor, the national museums are an integral part of that so if you want to find out anything to do with museums of any sort, the 24 Hour Museum is the place to go to. Collections Link, which we have talked about, will include, of course, a significant strand of resource and input from the national museums. One area where we have

worked quite closely with them is on the whole area of spoliation and repatriation which has taken quite a lot of time individually to do and we are now bringing all of that resource and guidance together so that anybody can find it. One other perhaps I will mention which we may come on to, which I think you may have heard about when you were in Rome last week, is the EU's Minerva programme. We are the UK managers of the collection of information about all digital assets, so we are the co-ordinators of everything from all cultural institutions but including the national museums to make that available. If I can hold up a rather heavy report, this is the report of Minerva which includes all the UK material in it. There are a number of layers in terms of those relationships, but the most compelling ones in terms of long-term strategy is both the Joint Advocacy Group and also the current work DCMS are leading on the National Strategy for Museums of which we, the national museums and others are a part.

Q313 Chairman: What about the British Library and The National Archives; do you have a similar relationship?

Mr Batt: Yes, we have very close relationships with both of them. We have got a memorandum of understanding with The National Archives in looking particularly at the whole area of creating more digital access to their resources and all the archives elsewhere in the country. In the British Library we have a number of overlapping circles, some to do with the preservation of material, and we worked with them on the deacidification of paper, and we also work with the British Library very closely on policy associated with public libraries. So there is quite a wide portfolio of activity.

Q314 Lord Young of Graffham: Could I address this to the MLA. We have heard a great deal about research but what I am interested in now is the use of existing technology. How do you go about promoting the effective use of IT in libraries and elsewhere? How would you define your objectives in doing so? Is it, for example, enhancing public access or is it preservation because that is a real responsibility which I know the British Library have grave concerns about in the digital era?

Mr Batt: It is all of the above. I will take you through a list of the things we are engaged with which will give you a flavour of it. In terms of our responsibility in encouraging access to technology, the thing I must mention is the People's Network, where we led on behalf of Government the creation of ICT learning centres in all 4,300 libraries across the whole of the UK (because it was a pan-UK project). Just to give you one statistic: that generated in the first year available 64 million hours of use of Internet and drove the roll-out to broadband and things like that.

That clearly was only a point of departure. We believe that our responsibility is to ensure that we use all available technology to give maximum access to the resources in our institutions, to work with others who are doing similar things, and to ensure that things which are either copies of three-dimensional objects or were born digital are preserved in a way which ensures their longevity. That is a problematic area but we, like the British Library, were founder members of the Digital Preservation Coalition and are still members of the board of trustees of that. If I can walk through some of the issues. We led as part of the People's Network a £50 million programme of digitisation which started the whole ball rolling back in 2001. That created a whole range of new resources, bringing together different sorts of institutions to create new collections. It is one of the wonders of digitisation that you can do that. From that we found ourselves in the position of being invited to act as the lead for the Minerva programme within Europe and we also engage at a number of other levels, so that for example I was in Luxembourg recently at a brainstorming session trying to work through with a whole number of other experts what the Seventh Framework should look like in terms of IST developments in terms of culture. It is not so much the conservation, which I know sits somewhere else, but trying to work out if they are putting money into the development of technology into cultural access and what are the important things to focus on? I have mentioned the 24 Hour Museum. We jointly fund with JISC, which is the Joint Information Systems Committee of HEFCE, the national standards-setting body for IT standards. It is called UKOLN. It has become so acronymic it has forgotten what it really stands for but it runs all of the metadata and things like that. We jointly fund that. We are developing now new resource discovery tools on our sites to try and find ways of demonstrating that perhaps sometimes Google is not the answer. There are many times you look for information and all you get is somebody trying to sell you something. That is bringing different institutions together. Perhaps the most compelling example that we are involved in, it seems to me, is a model of how we can develop a collective strategic framework for conservation. It is what Peter mentioned earlier, the Common Information Environment Group, which started with a discussion with ourselves and the JISC identifying that there are many different organisations—libraries, museums, archives and other organisations—creating cultural assets in digitised form and they are only going to work if you can get easy access to them. So we want to create this common information environment. I will not bore you with two years of what it has done but just to say that HEFCE has now decided they want to put significant resources into digitising more resources

and have asked us as a group to produce what I rather casually described as *The Hitchhikers' Guide to Cyberspace*, but what we actually mean is to produce a framework for e-content creation, which is both a map and a guide book because what a tourist wants is a map and a guide book telling you what to go and see but also how to get there, for the creation of digital content. This group has on it, to give you an idea of its strength, the MLA of course, JISC, the BBC, the British Library, The National Archives, English Heritage, the National Library for Health, which is part of the NHS, the DfES, so everybody who is involved. Everybody comes to the table as an equal partner to start to develop something which we believe is the strategic framework for bringing everything together.

Q315 Lord Young of Graffham: This is about access, is it not?

Mr Batt: No, it is about how you go about the standards that you use and the techniques that you use so that when you take something digitised in one collection it can be readily connected to other items from other collections. If institutions work together with common standards, the end user will gain access to far richer resources. It does require effective co-operation in the use of agreed standards.

Q316 Lord Young of Graffham: But the end objective is universal access in some way or other.

Mr Batt: Yes. I would like to call it a “knowledge right”. We need to be able to guarantee to the citizens of this country the right of access to all these wonderful resources, which takes them then to the institutions and the museums.

Q317 Lord Young of Graffham: What about the preservation of digital media?

Mr Batt: It is a complex issue. There are not really too many complete answers at the moment because of the vast amount of material. The work that the Digital Preservation Coalition is doing is similar to the Common Information Environment in bringing people together to talk about it. The critical work that the British Library is doing in trying to take photographs or a few snapshots of the Internet is echoing the work that the Internet Archive is doing in America. We are one-third of an international group called the Digital Cultural Content Forum. We do this with the Institute of Museum and Library Services in America and the Cultural Heritage Information Network in Canada to bring together people from around the world to have these kind of discussions at least once a year to try and identify common themes and problems because at the moment there are lots of solutions and we need to try to find ways of preserving material coherently for the future.

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Q318 Lord Young of Graffham: I am beginning to be sorry I asked that question!

Mr Batt: I will turn myself off now.

Q319 Chairman: It is all very interesting. Can I turn to the question of whether there might be a national conservation centre or not. In the evidence that you gave us you noted that back in the 1990s there was some discussion of the possibility of setting up a national conservation centre but there was really not very much support for it at that time. You hinted that it possibly was an issue worth re-visiting. Do you think this is so?

Mr Batt: What we tried to do in our written submission was to give a reasonably comprehensive view of what had happened and what was being done. We did think it was important that we should draw this to the attention of the Select Committee. Probably you have got a sense already that people are saying there is a lot going on and the critical task is, I think, not to produce one single place where all this can happen but to produce the co-ordination that ensures that whatever is done is in collaboration and that for the person that wants to find out there is a route into it which is not institution specific, and that could be Collections Link or it could be some other resource. The idea that is already emerging is a series of virtual communities of people working together. I think it is our responsibility—and when I say “our” I mean the co-ordinating organisations, the lead organisations in particular areas—to work together to ensure that whatever we do comes together in that virtual conservation centre which enables people to share and benefit. There is no point in the MLA starting from scratch, any more than there is any point in somebody else starting in another part of it. We need to work and be committed to working together to make it look as if it is one but actually it is lots of different organisations.

Q320 Chairman: We do not need a centre in order to carry forward the co-ordination?

Mr Batt: My experience of the organisations doing this sort of thing is that they work together and that gives it the impetus. One could identify an organisation that had the secretariat for it, but I think the real strength we have got at the moment is organisations which can pursue their own interests which can often push out the envelope in particular areas which can then be fed back into that shared commonwealth of resource, which is what we should be doing.

Q321 Chairman: Yes.

Sir Neil Cossons: I think powerful strategic co-ordination is crucial because there are, as I said earlier, very professional players already in many of these areas. Strategic co-ordination is there to make

sure that such resources as there are are best used by those organisations to push for more resources in those crucial areas of real need, and to ensure that if there are any gaps that need filling, then one of those agencies will expand to fill it. Our view is that to try and create a single entity would be very difficult and at the end of the day it would not actually produce the results that you might be looking for.

Q322 Chairman: It would divert resources and energy.

Sir Neil Cossons: Yes.

Q323 Lord Paul: The written evidence from English Heritage refers to plans to re-establish the British Isles Technical Forum, which would bring a range of researchers and practitioners together to discuss conservation. How are these plans progressing? Are other steps being taken to ensure that the best practice and the results of new research are disseminated to those working on historic buildings? Can I make one apology that if after listening I go away, it is not a reflection of what you have to say; it is with my Chairman’s permission I am leaving.

Mr Fidler: I will try and be brief to help you. Again it is an attempt by English Heritage and our friends in the other three heritage organisations—Historic Scotland, Cadw and DoE Northern Ireland—to bring together and share common problems and solutions to activities. We ran this forum for a number of years in the 1990s and we confronted common scientific problems and came to agreed solutions. We wish to reinstate this and wish to promote, without much prompting from yourselves, the possibility of increasing its scope and activities in relation to these scientific co-ordination roles we have been talking about. In the past for example, the Forum responded to new European and UK Government regulation impacts on the historic environment, notably the ban on lead carbonate in paint which was to be eliminated by the European Union as a toxic substance for obvious reasons. However, on scientific grounds we were able to prove to our own government and to Brussels that the material was a very important protective coating material for historic buildings and we received a derogation thereafter for controlled use. We have had a number of similar activities where the Forum was able to generate the right kind of approach to Government. Also, in terms of sharing resources, English Heritage and Historic Scotland, because we are the largest of the four agencies, are able to share the cost of research—for example our joint efforts on mycology and timber decay etc which produced this end publication: *Timber Decay in Buildings*. It was preceded by a larger piece of work with European funding which we shared with our colleagues in Dublin. We call it the “British Isles”

Technical Forum because we want to include our friends in the Irish Republic since they also share our common problems. We also have a network to share minutes from these meetings with our friends in the Netherlands and Sweden, ie northern European English speakers, and there is scope to do more in that regard. We have just sent out invitations to the first new meeting of the Forum, and we are hoping to hold it in London in the next two months.

Sir Neil Cossons: Just extending beyond that if I might for a moment, Britain's heritage is spread all over the world, which is a reflection of the last 200 years, and so we become the focus for organisations who have built heritage responsibilities in particular to come to us to get the sort of expertise that John and his colleagues are able to provide. We are quite ill-equipped I think as a nation—and I speak specifically for English Heritage—to be able to fulfil those responsibilities. I am not suggesting that the British taxpayer should pay for the whole of Britain's heritage as it is spread throughout the world but we are very anxious to co-operate with others who are willing to do that. In a post-imperial, post-colonial world there is an increasing willingness and enthusiasm for that. If I can give a particular complex example. One of the most challenging (in the scientific sense) conservation issues is the future of the Scott and Shackleton Huts on the Ross Sea foreshore, for which the New Zealanders are the foster parents, and of course they are looking to us, and English Heritage has been providing technical support for that in an informal way for a number of years now. Of course, they are looking to Britain to play a rather more positive role which we would like to see happen. So perhaps in looking at the wider compass of scientific conservation, my belief is that some of the best in the world happens in this country and we have the opportunity not just to share that but also to sell that. There is a business inside this body of expertise and I think there is also an enthusiasm.

Q324 Lord Chorley: It would be quite nice to pursue the Scott and Shackleton Huts but I fear we must move on. This is really addressed to the MLA and to some extent we have been over this ground but not very specifically. It is the question of how the results of new research and development of best practice is disseminated to your clients, the regional museums and collections.

Mr Winsor: The MLA certainly has a role in promoting innovation and gathering information about the results of conservation research.

Q325 Lord Chorley: It must be one of your primary roles, is it not?

Mr Winsor: It is certainly an important role.

Q326 Lord Chorley: Right.

Mr Winsor: We do pass this on and work hard to ensure that the wider community takes note and learns from this work. I think we do this through building the findings of best practice into the standards work that we do such as the Museums Accreditation Scheme. I think we also do this through the grant schemes we operate such as the Renaissance in the Regions programme and even the PRISM Fund where we fund conservation of industrial scientific artefacts. By specifying the conditions under which this work is done and conditions for the grants we can ensure that good practice is taken note of.

Q327 Lord Chorley: Things like conferences or more written work?

Mr Winsor: We provide guidance and expertise through Collections Link, which we mentioned previously. The advice and information that we and lots of other similar organisations have produced are made available to the wider community. It is the on-line resource, which is very, very new but it brings together the legacy information that the MLA has, the guidance and expertise from the National Preservation Office, The National Archives and some of the national museums and many other organisations.

Mr Batt: If I can just add one thing to that which perhaps reflects what you were saying about conferences. The lead museum in the West Midlands, the Birmingham Museum and Gallery, within the Renaissance in the Regions, as part of its development of itself as a hub, re-designed and re-created its own conservation unit at relatively low cost. They say that it was a change of culture and a tin of paint. They were motivated to actually see the value of rebuilding the conservation unit and at the same time they are going out and undertaking training for other people working in museums across the West Midlands. So there is a missionary zeal that is emerging from some of this which is spreading the good practice directly.

Q328 Baroness Hilton of Eggardon: I have a rather similar question for English Heritage about the restoration and preservation of buildings and the use of appropriate materials. How do you disseminate best practice in that field and how do you monitor what is going on in the way of keeping our buildings in good shape?

Mr Fidler: We try to set examples from our own estate. We offer our estate as a specimen for study by other researchers and we use it as a laboratory for our experimentation in various fields. For example, we have the longest running field experiment in the

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world for accelerated weathering of stone in terms of stone preservatives and stone consolidants. Most of these kinds of study are done in laboratories and we said, "Let's try it on the real thing and see how it performs," and we have published results which were favourably received. We give technical advice to government departments and to local authorities and other stock holders on the evidence of our success in using treatment and maintenance systems. Then through our grant conditions, we impose certain technical conditions about treatment methodologies and we learn from that activity and from the technical advice we give on scaffolding and on building sites about common problems confronting the conservation of heritage buildings. The best example of these activities in practice that would be the grant aid we have given to the English cathedrals over the last 10 years. We first commissioned a survey of the cathedrals, talking to all the cathedral architects and surveyors and finding what their common technical problems were. We then set up research activities to develop answers to those problems and published the results. Our work on the death-watch beetle, for example, has created a better understanding of the problem and solutions for the end users. In terms of monitoring, of course a lot of the front-line activities are the responsibility of local planning authorities and their conservation officers, and we work with them and help to build on their competence and expertise. We have a web site³ devoted to sharing best practice and we load up our own new information on to that site for them and for their bosses and their councillors. We have tried to create Heritage Champions in local authorities amongst elected officials to give political support to the activities of their technical staff. In terms of national strategic monitoring of standards, we commission the Buildings at Risk surveys that are published in our *Heritage Counts* annual reports, and we are developing a programme, outside the remit of this Committee, for historic parks and gardens at risk, looking at their state and condition and then planning to work with local authorities and owners to develop responses to those surveys.

Q329 Baroness Hilton of Eggardon: There was an initiative in Europe created by CEN to have a standard for conserving and preserving buildings. We do not seem to have got involved in that at all.

Mr Fidler: Yes, that is a very good question. This is CEN standard-setting work being driven by the Italian equivalent of the British Standards Institution, UNI. It has taken the UK by surprise with the speed of its development when it was set up. Usually long-term programmes for the development of European standards have a very formal procedure that is gone through and they take five or six years to

be developed. Unfortunately, the Italians have been very enthusiastic and have moved ahead at great pace and we have not been able so far to catch up in terms of providing the funding streams to get British expert representatives into the arenas to discuss the subject areas. I am happy to say that I had a meeting with the British Standards Institution a few weeks ago and we found some pots of money within BSI and from the Department for Trade and Industry for British experts to participate in this activity. English Heritage is now going to offer support to this standard-setting development work with the BSI. We will act as a co-ordinating point for that activity and the money is available for private sector, non-government funded specialists to participate in these committees. I am Chairman of three British Standards drafting committees and we had a meeting of the Building Lime Committee last Friday. This is part of BSI's standards work and we are feeding information from these existing British committees to the CEN Committee now.

Q330 Baroness Hilton of Eggardon: Thank you. That sounds very encouraging.

Sir Neil Cossons: At the home-owner advice level, there is a huge growth in interest by private owners of historic buildings to do the right thing by them and a tremendous take-up of the advisory notes and publications that we have, many of which have hard science in their hearts. John mentioned lime mortar. The growth of the provision of lime mortar in all its various guises for private owners is an indication of this huge growth in knowledge and understanding of historic buildings by owners of not necessarily listed buildings but their own buildings that have historical qualities.

Q331 Lord Chorley: Are people like the RIBA getting more interested?

Sir Neil Cossons: Indeed so, conservation architects are a major part of the architectural profession and of course are engaged in conservation architecture.

Q332 Lord Chorley: I was thinking of the ordinary architects who could do an awful lot of damage.

Mr Fidler: That is true. I sit on the RIBA's Conservation Committee and it has a remit to develop guidance and advice for the wider membership of the Institute. I have to say that my fellow architects sometimes think that general practitioners can do the work of surgeons, to use the medical analogy, and we are working very hard now with the Institute to develop supporting education and training for the general membership of the Institute to drive those who think that there is a good market for their activities towards accreditation as specialists in conservation. For the statistical records, there are 28,000 architects in the UK as a whole and

³ www.helm.org.uk

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we have got around 400 architects accredited now in building conservation which is a small but significant step.

Q333 Lord Chorley: I am delighted. I was not being facetious. We all know of dozens of listed buildings where almost certainly lime should have been used and they have been wrecked by cement and wrecked in a way that cannot be reversed.

Mr Fidler: Yes.

Lord Chorley: I am sorry.

Chairman: Can I bring this session to an end. It has been a very long session. In doing so can I thank all four of you for coming and sharing your knowledge with us. I think it has been an extremely useful session for us. Thank you very much indeed. If there are any issues which have arisen where you would like to supplement what you have said, please do not hesitate to write to us. Anything that you do send in in writing will be published alongside the transcript of this session so it will be given full publicity. Once again, many thanks indeed for coming.

TUESDAY 16 MAY 2006

Present	Broers, L Chorley, L Finlay of Llandaff, B	Sharp of Guildford, B (Chairman) Sutherland of Houndwood, L
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Memorandum by the British Museum

The call for evidence indicates that the enquiry will look at “the application of scientific and engineering techniques to conservation, and at the ways science and technology can enhance public understanding of and access to cultural objects.”

These issues are at the centre of scientific examination, analysis and research in the UK’s publicly-funded museums, libraries and archives, which, along with some university departments and other bodies such as English Heritage, are the principal centres for the application of scientific knowledge, techniques and methods to the preservation and presentation of cultural heritage in the UK.

SCIENCE AND CULTURAL HERITAGE

In museums at least, three principal aims can be identified for science and technology. These aims are in keeping with the role of museums in the long-term preservation and conservation of artefacts of cultural importance, their study to increase knowledge and understanding of the cultures that produced them and increasing public understanding of and engagement with these cultures and traditions.

1. *Investigation of materials, techniques and technologies*

When formal research laboratories were established in many European and American museums in the first half of the 20th century, one of the principal aims was to elucidate the materials of which objects were made and to study the history of the technologies that produced them. For many large museums, the technical examination of the collection to support curatorial enquiry and to engender public understanding of the techniques and methods of the creation of artefacts remains a core objective.

Through the analysis of artefacts it has been possible to develop patterns of material use for many types of metal, stone, pigment, natural adhesive, etc. Such a framework has facilitated the study of the cultural climate in which objects were produced, for example by linking patterns of use to patterns of trade—for example, analysis of wood samples from ancient Egyptian coffins has elucidated the technology of their construction and patterns in the trading of wood. The framework also provides a background against which anomalies can be judged, allowing an assessment of authenticity (and hence value) to be made—for example, the *Madonna of the Pinks* by Raphael was found to contain several pigments characteristic of the artist and his immediate circle. The technical study of materials has often revealed to a modern Western audience the reasons for material choice in other cultures—for example, the microstructures of the furs and skins used in Inuit cultures for their warmth or water resistance clearly indicate the structural origins of the properties which the Inuits know from tradition.

Public enthusiasm for exhibitions, displays, catalogues and books that make use of, or focus on, the examination of objects have proved enormously popular, whether they focus on the techniques of a particular school of painting or the detection of forgeries (for example, *Fake? The Art of Deception* by M Jones *et al*).

This activity combines scientific examination and research and development. Much of the activity uses established scientific techniques to increase the base of knowledge about the materials under study, but there is also an element of research in the development of new or improved analytical techniques, or the adaptation of techniques developed elsewhere in the scientific community to the very particular needs of the analysis of cultural heritage, characterised by the requirement to work non-invasively where possible and on microscopic quantities where samples must be taken. There are however some instances, for example in the fields of 3D imaging and non-invasive imaging, where the “science for cultural heritage” sector is a major contributor to original research.

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2. *Conservation science*

Conservation science can be connected to two aspects of the conservation of cultural heritage, the preservation of the artefact and the treatment of the artefact. The two activities are related and are based on the need to understand how materials change with time. Scientific study of deterioration allows the development of preservation and treatment methods. Conservators benefit through previous research and rapid feedback by scientists on technical questions during conservation or the preparation of display environments.

One of the bases for conservation science research is a knowledge of the materials of which artefacts are made, and it can be seen that in this respect the activities described in section 1 are a necessary prerequisite for the development of conservation methods or preservation strategies. Indeed, in most museums there is no division between scientists analysing materials to elucidate their history and technology and those engaged in scientific study for conservation purposes.

In its dual role of assisting in the preservation and treatment of objects, one of the principal themes of conservation science research is the deterioration of the materials (and their composites) in both the movable and immovable heritage. Research has focused on the effect of a number of agents of damage, including light, relative humidity, atmospheric pollutants, dust, shock, vibration and pests. The deterioration products have been identified and the processes by which they form studied. Conservation science has examined the ways these products might be removed from artefacts (if this is appropriate) and methods of future display that will render them less vulnerable to further deterioration.

This process of implementing measures to reduce future deterioration has been termed “preventive conservation” builds on the findings of conservation science, seeking scientifically sound methods of applying the results to practice in museums, libraries, archives, historic houses, etc. In the past, this has relied on developing or refining new technologies to deliver reduced deterioration, but increasingly this approach is being replaced by lower technology solutions that are more sustainable in the long term but which require a more subtle understanding of the principles underlying the material issues affecting the artefact. For example, the practice of air-conditioning entire buildings is now seen as unsustainable and wasteful; local conditioning of cases or natural buffering of the environment are preferred solutions.

The role of the conservation scientist in supporting practical conservation treatment builds on the knowledge of the materials in the object and the deterioration mechanisms at work, supplemented by research into the materials and methods applied in current and past conservation treatments. In a typical collaboration between a conservation scientist and conservator, the scientist might identify the materials of the object, deterioration products and previous repairs, such as glue, filler or consolidant. With this information, appropriate methods and materials for re-treatment can be determined. In this way, the conservator, conservation scientist and curator will work together in the decision-making process.

Working together, conservators and conservation scientists have developed methods for identification of materials and have developed and tested new conservation methods and materials. In institutions which do not have conservation scientists, the results of these findings are at least available through the literature, but this cannot replace the possibility of iterative interaction during the course of a treatment.

This activity again combines scientific examination with research and development, particularly the development of new methods of monitoring agents of deterioration such as atmospheric pollutants and the development and testing of new treatment techniques. Many of the scientific principles behind conservation research have developed in other sectors, but the unique nature of the deterioration processes affecting objects which can be thousands of years old and which may have been buried for a greater part of this time, and the materials needed for conservation treatment have led to much original research in the field that could not be conducted in isolation from the collections for which they are relevant.

3. *Application of new technology to enhancing public engagement*

Science and technology play a dual role in increasing public engagement with artefacts and through them the cultures and traditions behind them. First, as mentioned in section 1, scientific enquiry provides new insights into the use of materials, techniques and practices, that help to place the artefacts in their cultural context. Second, the use of new technology can enrich the experience of the visitor to museums and other cultural centres, or provide a means for others to enjoy and understand the artefacts in the absence of, in anticipation of, or following a visit.

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The majority of museums, libraries and archives maintain web-sites that give access to information, and often images, for the most important artefacts in their collections. New content that takes advantage of video footage, animations, 3D rendering or visualisation of objects and 3D reconstructions of incomplete objects or ruined building is becoming common on these web-sites.

Some museums have gone a step further, by introducing audio or image information into the galleries or purpose-built information suites. These include the Compass system in the reading room at the British Museum or the ArtStart system at the National Gallery. Consumer-based technology such as PDAs, or downloads to MP3 players are being used to provide information to individuals as they traverse museums, a trend which looks set to continue.

SCIENCE AND CULTURAL HERITAGE IN THE UK

4. *History and international context*

Conservators and scientists in the UK have played a full part in the development of the field at an international level. When the International Institute of the Conservation of Artistic Works (IIC) was established in the early 1950s, conservators and scientists in major UK museums were among its first officers and editors, a role that has continued. Equally, representatives from the UK have been extremely active in the other major international organisation, the International Council for Museums Conservation Committee, with several UK conservators and scientists leading working groups within the organisation.

In the UK, the Institute for Conservation Science (ICS) was established in the 1990s to represent the growing community. This organisation had its origins in a loose group of scientists working in national museums and galleries; with the formation of the ICS the group expanded to include libraries, archives and other national organisations such as English Heritage, Historic Scotland and the National Trust.

The recent amalgamation of the organisations for conservation in the UK into the new Institute for Conservation (ICON) has presented the opportunity for the ICS to merge to form the conservation science group under the auspices of this larger umbrella organisation; negotiations on this merger are current.

5. *The structure of conservation and conservation science in the UK*

Although the establishment of a single national centre for conservation and conservation science was considered in the 1950s and 1960s, the UK did not follow the route of some other European countries and Canada in centralising activity in this way. While the distribution of conservation science activity across a number of bodies risks dilution and duplication, the community is small enough that personal contact between scientists can ensure that resources and expertise can be shared and that links with higher education partners are sought for additional collaboration and equipment sharing. It is possible that a more formal forum for this *ad hoc* activity might help to strengthen these links—a forum that might be established as the result of this inquiry. The great advantages of distributed laboratories are twofold. First, research on artefacts is best conducted close to the point where these objects are stored or displayed (to minimise potentially hazardous transportation and handling) and by those who know the collections and their materials through regular contact. In addition, the possibility of in-house scientific analysis allows conservation and curatorial questions to be answered rapidly during the course of investigation and as a result of a dialogue between disciplines centred on the object. Second, if budgets and resources are scarce in one institution, then progress of conservation science can continue elsewhere until the situation changes; recent severe cuts to the budgets of the Dutch and Canadian national centres demonstrate the danger of concentrating all research in the field in a single institution.

While it is best to retain the independence of the laboratories throughout the UK that conduct conservation research, there are benefits associated with a more formal co-ordination of this network of leading institutions to produce a national strategy for research and a sharing of distributed resources.

6. *Training*

While the training of conservators in a variety of disciplines is well-established at many higher education institutes in the UK, there are now no equivalent programmes for conservation science. The situation in Europe is slightly better with university courses in a number of countries the most notable being a distance learning course based at the Università di Bologna.

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The main route into conservation science is through a degree in natural sciences or engineering followed by a DPhil in a relevant topic, a post-graduate course in a specialist area of conservation (or conservation science), or a post in a museum department where on-the-job training in the application of that scientific discipline to conservation is offered. Although some science is taught on all the conservation programmes, it is not generally sufficient to allow a graduate from that course to enter conservation science unless they already have a strong science background, preferably at first degree level.

The number of post-graduate research students in conservation science is relatively small, partly due to the issues of funding mentioned below, and the ambiguous position of the discipline, between art, history or archaeology departments on the one hand and natural sciences and engineering faculties on the other. There are no post-doctoral fellowships available in conservation science, except through EC initiatives such as the Marie Curie fellowship scheme. This is in contrast to the USA, where the Mellon Foundation has been supporting fellowships in museums for post-doctoral scientists interested in a career in museums.

THE STATE OF SCIENCE FUNDING

As most research is conducted in the larger, national museums, this research is effectively funded by the grant-in-aid payments to these museums; it is very rare for conservation science to be represented in smaller museums. Over the last two decades, funding has failed to keep pace with inflation, so like all other museum activities, science research, where it is affordable, has been limited by resources. As a result, the high reputation of the scientific research within museums the UK is under threat. An action which would have an immediate effect in halting this decline would be to channel a proportion of any additional funding for conservation science through the national museums and libraries.

Two alternative streams of funding have been explored by researchers. The first has been to join collaborative projects, either within the UK or internationally. UK funding for research has often come through joint projects with university departments eligible to apply for funding from one of the Research Boards. The recent granting of AHRC analogue status to some national museums and galleries, including the British Museum, offers the opportunity for fuller participation, but also serves to highlight the problem museums have experienced in the past—that scientific research into cultural heritage generally falls between the remits of the arts & humanities and scientific research sectors. Even schemes such as that for science-based archaeology are too restrictive, as they have not funded research in the application of science to fine and decorative arts. Greater collaboration between Research Boards in this area would be welcome, perhaps even to the extent of establishing a “science for cultural heritage” board.

Another issue with research funding through recognised academic channels is that because museum science crosses the “two cultures” of art and science, its status as a scientific discipline is not always fully recognised by colleagues outside the immediate field and its peer-reviewed journals are not recognised in research assessment exercises, perhaps because they place an emphasis on practical application of science to conservation practice in order to maintain their relevance to the target audience, those working directly with artefacts.

At the same time UK researchers have participated in many EC-supported research projects in the field of science and information technology for the study and dissemination of cultural heritage. This has proved a useful additional source of funding and has provided an opportunity for fostering greater international collaboration, but the twin issues of changed research priorities within the EC away from this topic and the priority given to funding for the nations recently accepted to the EC have reduced the opportunities for UK research to benefit from such projects.

A second stream of funding is through sponsorship, grants, or material in kind from foundations or companies. This is, however, a fickle source and cannot be relied upon for long-term programmes of technical examination, conservation support or research. Nevertheless, it can often allow novel methods or techniques to be investigated which might not be supported from core funding.

SCIENCE AT THE BRITISH MUSEUM

The British Museum recently brought together its well-established research laboratory and conservation science laboratory to form a single science group, better able to address the cross-disciplinary nature of modern scientific examination, analysis and research in the museum. As such, the British Museum is well placed to pursue, in a concerted effort, the dual themes of scientific research mentioned previously; that is, the investigation of materials, techniques and technologies, and conservation science. The long history of scientific

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research at the Museum affords a rich archive of comparative material and through intergenerational exchange an “inherited” expertise.

The scientific and conservation groups are located within the same department, so that the closest possible co-operation between scientists and conservators can be achieved. As the department is located within the museum, access to the collections and the curatorial input needed for collaborative research is maximised, while damage to the collections through transportation to external laboratories is minimised. The department liaises with the communications, marketing and learning initiative departments to ensure that maximum use is made of scientific information in increasing public engagement in the collection and the cultures and traditions it represents.

In its role as a national resource, the museum provides scientific services to coroners under the Treasure and Portable Antiquities schemes, and offers support to regional museum and archaeological services whenever possible. The department is committed to establishing and maintaining mutually beneficial collaborations with other museums and universities and libraries nationally and internationally and to the training of scientists in the field of cultural heritage through participation in teaching, mentoring and internship programmes.

Members of the science group participate in national and international professional bodies, publish and lecture widely, and have participated in national and EC-supported collaborative research projects. The British Museum has NERC analogue status, recently gained AHRC analogue status and is negotiating with other Research Boards to this end.

SUMMARY

Scientists in UK museums, libraries and archives play a vital role in the preservation and presentation of the UK’s cultural heritage.

Scientific study to elucidate history, technology and cultural tradition and scientific study to inform conservation and preservation are both important aspects of the application of science to cultural heritage, but artificial boundaries between the two disciplines should be avoided.

Conservation science in the UK has a good international reputation, but this position is in threat. Training for conservation science should strengthen and formal programmes, perhaps in collaboration between museums and universities, should be fostered.

As the majority of conservation research is conducted within National Museums, Libraries and Archives, direct financial support through predicated funding within museum grant-in-aid funding would best sustain and advance the discipline in the UK. In addition, a body might be established to co-ordinate a national strategy for science research within this network of institutions.

The British Museum has a large and active scientific group and is committed to maintaining the highest standards in scientific examination, analysis and research, to the training and development of the next generation of scientists working in museums and the conservation field and to the widest possible dissemination and interpretation of information to the scientific community and to the public.

Memorandum by Tate

CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

Conservation Science in the UK is mainly carried out in trustee museums and galleries, and therefore tends to follow the priorities of the museum rather than a central government directive. On an international level research and analytical results in conservation science are disseminated through peer reviewed publications from two organisations: The International Institute for Conservation of Historic and Artistic Works (IIC) and the International Council of Museums-Committee for Conservation (ICOM-CC). At present there is no central co-ordinating body on a national or international level although the Institute of Conservation Science (ICS) is a recently formed professional group established by practitioners to address the lack of overall co-ordination in heritage science. Tate Conservation Scientists are members of this group; one of our Conservation Scientists is currently Chair of this Institute which provides a useful forum for information and discussion.

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Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

The museums are funded by DCMS and are committed to DCMS objectives, which include the conservation of their collections. Beyond this, there is no central government funding of conservation science and until recently no mechanism for funding through the Research Boards. This year the AHRC have offered to fund museum research, and Tate recently was one of eight out of 15 cultural institutions to achieve university analogue status. Tate collaborates internationally on specific projects eg modern paints with the National Gallery of Art, Washington and the Getty Institute in Los Angeles. EU projects allow international collaboration but only on limited projects heavily biased towards university research. Trade or other industrial bodies do not contribute to research, except occasionally as sponsors, eg AXA insurance.

Tate maintains a small core staff (three) to define, maintain and exploit a research programme. The capacity and skills base is very small. Our conservation research depends on funding from non-government research bodies such as the Leverhulme Trust, other educational charities, sponsorship, and altruistic individuals. This allows us to expand on our core staff for specific research projects. Despite our ability to attract funding it is nevertheless limited because conservation science falls between recognised disciplines. It would be highly beneficial to have a centralised funding body specifically for conservation science research.

Training is available in science and conservation but there is no specific course for conservation science. A minimum qualification is a first degree in science and a post-graduate degree related to a conservation project. By funding projects speculatively with intermittent funding it is difficult to establish a career structure for conservation scientists. Many well trained (6–7 years) and skilled researchers leave the field after their PhD. This is wasteful and limits our ability to exploit the expertise we develop through research grants. At Tate our conservation research is broadly directed at the right areas, but funding is not adequate and priorities are biased by the need to secure external funding. To further evaluate priorities, Tate has recently introduced an overall Research Priority Framework.

The USA and the Netherlands fund conservation science more effectively than the UK. Recently the Andrew Mellon Foundation has made endowments to US museums for posts in conservation science. The Netherlands has also benefited from very significant government funding for conservation initiatives, which fostered ground-breaking scientific research. Unfortunately long-term sustainability was not built into the Dutch initiative. Italian science is also well funded, often by EU projects, but this tends to be through university departments. The Italian system is not a good model, since it often addresses the wrong issues because specific expertise in conservation science is not fully developed with the result that projects are not well directed to conservation needs. On the whole smaller European countries have very few scientists in museums, Norway being an exception. In France they are concentrated at the Louvre and other nationally-funded laboratories for museums and in Germany they are dispersed to regional centres.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

Opportunities in the UK for cutting-edge science applied to conservation are limited by restricted funding. Opportunities for support outside the heritage sector are rare. One exception is Tate's anoxic framing project that has just received funding from the PSRE fund to commercialise a novel framing approach. This project, to develop oxygen reduced atmosphere for framed works of art on paper, is definitely on the cutting-edge of science and technology applications. It may even have applications beyond its original aims in the public sector. Because our projects are concentrated on Tate priorities they have direct practical application. By disseminating results world-wide the entire heritage community benefits. For example our transport studies have enabled a massive increase in international exhibitions and activity at Tate to take place without increasing the risks to objects.

Tate is currently investigating a plan to further cutting-edge science and technology in the service of our cultural heritage. The study of the materials and techniques used in a work of art (technical art history) is an emerging field, which impacts on both the preservation and interpretation of art works. Tate recognises that we can build on our expertise in this area and take it much further using state-of-the-art analytical techniques to strengthen our knowledge base and develop new analytical methodologies. At present we are planning to build a centre for the study and conservation of our collection (The Collections Centre). We are studying the feasibility of incorporating at its heart an analytical facility to be shared by other museums/galleries/conservation training programmes nationally and internationally. By grouping advanced core

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instrumentation in one facility designed specifically for conservation science it will be possible to carry out both innovative research and routine analysis at the highest level, contributing to the advancement of technical art history, conservation treatments, and preservation initiatives in the UK and worldwide.

Is there a satisfactory process to develop practical applications of conservation research for the market?

The PSRE funding we have recently received (see above) is a first for Tate's Conservation Department and offers an exciting new opportunity. Generally there has not been a satisfactory process to develop practical applications for the market. There tends to be a relatively long delay between research and implementation, in part because conservation has limited new investment and in part because the criteria for evaluating and recommending new practices are high (due to the precious nature of the objects and attendant risks).

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

To reach a wide audience we are actively developing the conservation science portion of Tate's website. Through Tate Publishing conservation science at Tate has contributed books as well as exhibition and collections catalogues essays. These rely on scientific analyses and documentary studies of art materials to elucidate how artists' use of their materials can influence our understanding of the works they create.

Tate's new Collections Centre with its analytical research facility would incorporate public access so that visitors can see the full range of scientific and technological instrumentation being used to push the boundaries of our knowledge about the works in our cultural collections.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

A powerful database, The Museum System (TMS), is used at Tate to manage the collection in house. By improving access, location and information handling on objects in the collection this system facilitates our ability to mount exhibitions and displays for the public.

At Tate hand-held computers are replacing audio guides for exhibitions and displays. Such devices greatly enhance the visitor's experience by increasing the level and amount of information available for a given object or exhibition.

Tate's conservation department is currently seeking funding for a project to record inherently unstable plastic sculpture digitally in 3-D to capture as much information about it as possible before it is lost due to the degradation of its component materials (eg Naum Gabo used very early plastics in his sculptures which are now losing their visual and structural integrity). This project will also explore the ethics of reproducing deteriorated works. Other similar areas of "virtual" restoration are planned which rely on digital imaging to re-create the appearance of objects without carrying out actual restoration.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

We now use electronic methods for all data collection but in a museum/gallery there are many older paper records that need to be accessed and it would be useful to do so electronically. An initiative to record the 19th century manuscript archive of one of the UK's leading artist suppliers (Winsor and Newton) using digital images of each page is currently underway funded by the AHRC with Tate as a co-applicant. This project eliminates the need to transcribe hand written documents into an electronic format and demonstrates the value of linking electronic manuscript page images with an indexing database. It has many applications for a wide range of archival records.

As museums/galleries begin to use more IT, for instance websites, and hand-held computers for exhibitions and displays, the demand for greater and more sophisticated levels of information on the context and interpretation of art works will increase. It is important that we anticipate this need and initiate collaborative research between conservation scientists, curators and conservators that develops the breadth and depth of our knowledge.

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What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

Computer access, through websites and through hand-held devices available as guides and information sources in exhibitions and displays will no doubt have the greatest impact on public access and understanding of cultural objects in the future.

Memorandum by the National Museums of Scotland

We consider that conservation science is a vital part of the strategy for museums to deliver best practice in conservation of their collections. It is particularly important in national institutions with their primary responsibility for care of the nation's collections, both within their own institution and by providing guidance and support to smaller museums. We consider that it is achieved most effectively when provided by specialist scientific staff working closely in-house with the conservation and curatorial experts and the collections.

The National Museums of Scotland employs 20 permanent staff in the Conservation and Analytical Research Department to work directly on the collections, and has further professional conservation staff in the Collections Management and Natural Sciences Departments. Five of these staff are involved on in-house conservation science projects and applications which range from preventive conservation monitoring of the museum environment to the refinement of treatment methods for the conservation of waterlogged wood. Further projects are undertaken by collaborations or research partnerships with university scientific departments in Edinburgh and internationally. The scientific staff within NMS also analyse and examine objects using non-destructive and micro-sample analytical methods to support conservation and curatorial understanding and thus their preservation and presentation of the collections to the public.

We would be pleased to provide more details of these projects and their outcomes to the Sub-Committee should this information be required. We respond below to the questions posed in the call for evidence.

1. *How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?*

1.1 There is no central or formal co-ordination of conservation science between different bodies. Largely speaking the direction and subject areas are determined by:

- The needs of the “users”, ie heritage bodies who have a duty of delivering conservation, particularly where this deals with problematic materials or conditions;
- Funding opportunities or initiatives provided by government, research council or European initiatives;
- Research interest of individuals, university or heritage groups;
- Common needs or opportunities recognised through meetings and conferences of practitioners, conservators and scientists.

1.2 At an operational level the discipline networks quite effectively through personal and professional contacts and the opportunities provided through conferences and professional groups or societies such as the Institute of Conservation Science (ICS), the Institute of Conservation (Icon) and internationally the International Institute of Conservation (IIC) and International Council of Museums Conservation Committee (ICON-CC).

1.3 However the absence of any overall co-ordinating or funding means that strategic planning across the UK is limited. Conservation science is a broad discipline dealing with a wide range of materials and calling upon scientific expertise in many different disciplines. The impact to practical conservation may be to very specific issues, such as understanding the condition of individual objects or structures, or it may lead to better general understanding of materials and preservation strategies. This breadth of question and application together with the cross disciplinary content has to be recognised in any co-ordination process.

1.4 Conservation science has a low profile. Scientists or research groups in universities often become involved through personal contacts or interests, rather than from knowing the conservation questions; the research benefits in terms of grants and high impact science publications may not be evident; or the conservation problems may require more routine analysis or applied research time than can be made available.

1.5 The number of conservation scientists in the UK is small: some conservators are able to undertake valuable scientific research; some university groups are regularly involved; and there is a very small number of independent researchers. Only larger museums, galleries, libraries and heritage agencies are able to fund

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and resource full time posts. This small group plays a vital role in providing direct in-house analytical work and interpretation for their institution. It also provides an informed scientific interface between the largely practical conservation led questions and commissioning or interpreting scientific research from university or other experts.

1.6 Strengthening this base of full-time conservation scientists and enabling them to serve a wider community of smaller museums and other bodies would greatly increase their ability to build relevant links between the heritage and university communities. The improvements in critical mass would help deliver an improved service and provide more focus for co-ordination of scarce resources.

2. Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

2.1 While larger heritage intuitions are able to commit funding to maintain essential internal applied research and even to commission specialist external contract work, other funding is both opportunistic and varied.

2.2 In-house research can be targeted very directly at problems relevant to the commissioning institution, and the outcomes then spread to the wider community through meetings, conferences and publications.

2.3 Alternatively less directly applicable research may be planned and receive significant external grants or awards (from UK research committees or the EU frameworks). These research topics may have less immediate application, or lead to outcomes which then have to be promoted and taken up by the conservation community.

2.4 A further significant area of research is in short-term student or intern projects such as part of graduate training: often these projects will address specific conservation issues, but by their nature may be insufficiently complete or communicated to lead to new practices.

2.5 Conservation science research questions are only relevant if they really address preservation problems or lack of knowledge and have outcomes which inform conservation decisions, practices and understanding. Conservation scientists working closely with practicing conservators play a pivotal role in promoting effective understanding and communication between different professional groups and in formulating the questions.

2.6 Where the research is taken up because of less direct conservation interests, or moulded to conform to a funding opportunity, then it is less likely that the outcome will either really effect conservation practice or be significant in improving the ability to preserve heritage.

2.7 The UK skills base (in conservation science) is small, comes from a range of sources and covers a wide field. It is inadequate either to direct research or to ensure that the results of best practice from recognised research or experience can be carried through for many of the institutions which care for the heritage: for example, the benefits of the testing of materials which are safe for storage and display of artefacts is well proven, yet few institutions are able to routinely do this; the light-fastness of textiles or images differs greatly with the dyestuffs or process but these can rarely be analysed; salt damage is problematic in both artefacts and the built heritage but the composition or characteristics of the salts can rarely be determined to inform treatment strategies.

2.8 These issues could be improved by the provision of moderate funding which would enable the conservation-scientists referred to above to undertake or commission work for a wider base of users. This might be done by assisting existing units with resources to allow them, as specialist conservation science hubs, to provide support for defined geographical and subject areas.

2.9 Long-term needs of cultural heritage will only be met if there is sustainability of the skills base (and reference collections), by long-term staff funding and career structure, by the provision of training and internships, and by ensuring that there are resources which give opportunities for sharing of skills and experience between workers based in different locations.

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3. *How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?*

3.1 The UK has led the field in many developments in conservation science. It still compares well with both European and North American countries in terms of quality and relevance of output. This is demonstrated by the quality and quantity of papers at international meetings authored or presented by groups in the UK.¹

3.2 The UK does not have institutions with a common remit and central funding on a national basis specifically for conservation and conservation science (eg the ICN in the Netherlands; the KIK-IRPA in Belgium; the CCI in Canada). Nor does the UK have scientific groups within cultural institutions with equivalent size or funding to match those in France (eg the C2RMF; the LRMH). We feel that the existing UK situation would be strengthened by developing more formal partnerships between existing parishioners, rather than by attempting to establish a central conservation institute.

3.3 Conservation Science is well placed when it is integrated with both practical conservation and analytical facilities. It is less common for institutions in the UK to have in-house scientific facilities for artefact and materials examination and investigation compared to the USA, where many museums have analytical laboratories and extensive facilities. In London the BM, V&A, NG, BMNH, Tate and HRP have specialist analytical facilities and scientific staff; outside London only English Heritage, NMGW and NML in England & Wales and the NMS in Scotland. The analytical methods used in these institutions, while generally adapted from well developed techniques, are novel in their refinement to work on complete artefacts or micro-samples. This work may lead to the use of cutting-edge technology to further refine the analyses or deliver new information by collaboration with university research groups (eg GC mass-spectroscopy applied to organic materials from artefacts, LC-MSⁿ for accurate chemical characterisation of natural dyes, PIXE and synchrotron X-ray techniques for trace element analyses, SIMS for depth profiling of corrosion layers).

4. *Is there a satisfactory process to develop practical applications of conservation research for the market?*

4.1 As outlined above, conservation science research is communicated through conferences and associated publications or in conservation journals. Some is published in more mainstream scientific journals, and in EU project reports. The majority cater for English language readership. This means that, in principle, there is good opportunity for the outcomes of research to feed into conservation practice. However there are obstacles to this actually happening:

- Presentations and publications are aimed to emphasize novelty and may be hard to understand outwith the expert area, such that communication is rather between scientists rather than with conservation practitioners.
- The levels of scientific support used in research projects may well rely on a range of techniques only available to the publishing research group.
- Research projects may provide deep study of very selected problems, without leading to general principles for improved treatments or practices.
- The cost, both in time and in resources, is very often simply not available to conservators in more routine work, even for well proven analytical work.

4.2 When improved ways of understanding the condition of objects have been developed they may well require conservators to apply new analytical methods as normal practice eg ion chromatography rather than conductivity—so such methods need to be developed and made available. While these add to the cost of conservation, they have a cost/benefit of producing better results and thus better conservation.

4.3 We suggest that the situation would be improved if it was possible to provide more interpretation of new conservation science research together with better systems for its application by the conservation community. This requires more opportunities for those engaged in conservation to spend time participating in workshops and subsequent experimentation, allowing new methods to be tried and tested over a wider range of applications. At the moment the range of such courses is limited, and their cost is high: making them more accessible and building capacity through partnerships would greatly improve the sector.

¹ At the Conservation Science 2002 meeting in Edinburgh organised by NMS and the Institute of Conservation Science, 40 per cent of the 42 papers were from UK groups. In the sessions on preventive conservation and conservation methods 42 per cent of the authors and co-authors were from museums, the remainder from universities and institutes; in the analytical methods sessions then the proportion of museum staff fell to 24 per cent.

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5. *Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?*

5.1 Our experience of presenting conservation and conservation science to the public leads us to believe that this is an area with plenty of opportunity to stimulate interest in scientific techniques. It is a fairly common experience to find that public visits to the laboratories are oversubscribed, and that visitors of all ages (from school visits to professional societies) are fascinated by being able to see historic artefacts or specimens. This engagement makes them keen to hear about the science which allows us to preserve and understand the objects. The magic of the objects opens up an easy way to make the chemistry, physics or materials science appealing and immediate.

5.2 Larger scale exhibitions which illustrate scientific study of artefacts are also popular with the public: two events at the NMS, one illustrating investigation of the Egyptian mummy collection, and the other the challenges of preserving modern plastics, both met with a high level of public interest and support. Similarly, regular events in the Edinburgh Science Festival have used conservation science or scientific investigation of museum material to present scientific ideas and results to the general public in an accessible way.

5.3 Conservation science work can be used for more formal education: the NMS publication on the preservation of plastics that followed from the above exhibition is now an established text book in conservation science teaching. It has also, along with the Mary Rose project, been taken up in the recent schools science text book *Conservation chemistry* by the Royal Society of Chemistry as a teaching resource for secondary level curricula across the UK.

5.4 Museums and science centres now have many interactive exhibits which encourage active participation with young people and other visitors. However the presentation of conservation science, explaining how artefacts are preserved and conserved, how the materials are analysed, and how such studies reveal information about the use and history of the objects or their environment, is less common. This is at least in part due to funding—it is a significant investment for any one institution to develop and maintain such displays. It may be therefore that provision of some central funding which would enable a program of displays to be developed in a more co-operative way between institutions would allow better exploitation of this information.

USE OF INFORMATION TECHNOLOGY

6. *In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?*

6.1 At the most basic level, making background information about work which has been undertaken on objects—for example X-radiography of artefacts after excavation before they have been conserved for display—can increase understanding and interest in the material. Such information can be provide equally well on web-based virtual displays as in real galleries.

6.2 We have used Computer Tomography (CT) to scan Egyptian mummies to:

- Recreate faces from the CT data without any intervention of the fully wrapped and mummified human remains.
- Create layered images of the mummies to display how the body has been wrapped and embalmed.

6.3 We have also used hi-resolution optical 3D scanning to virtually re-unite the extremely fragile skull and detached jaw of a child from the 19th Dynasty so that a plaster model could be made with subsequent facial reconstruction.

6.4 The virtual reconstruction of images and painted surfaces is used in many presentations, although we are aware of few examples of interactive displays where visitors can themselves virtually restore paintings and then see the colours under different lighting conditions—something which must be feasible and would be attractive. It could also be used to investigate public preferences in the optimal degree of restoration. Such methods can equally be used in investigating colour on faded textiles.

6.5 Virtual reconstruction of missing parts—Venus de Milo etc.

6.6 Technology to give sensory information (building on computer games techniques) about surface texture—both from fragile object surfaces and from virtual reconstructions.

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6.7 Properly managed live links or recorded reports from conservation studios—as at the Conservation Centre in Liverpool, can use any number of technological methods for visitors to see in detail both the conservation techniques and the features of the artefacts themselves.

7. *Is there scope for improving the use that UK galleries, museums and others make of such technology?*

7.1 Most of the above could be more available to other museums and galleries once they have been developed in one institution. However there is no mechanism for such transfer, which is often the result of individual work rather than funded projects with a deliverable aim for wider application. To achieve the latter would require consensus between partner institutions.

7.2 One possible development might be the central provision of conservation records and data about the examination of artefacts. Currently this is managed on an individual basis within institutions as part of their object database. Conservation data would be a significant part of more (virtually) centralised national object database.

8. *What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?*

8.1 The new Conservation Centre at Liverpool: <http://www.liverpoolmuseums.org.uk/conservation>.

Examination of Witnesses

Witnesses: MR NEIL MACGREGOR, Director, DR DAVID SAUNDERS, Head of Conservation, Documentation and Research, British Museum; MR ALEX BEARD, Deputy Director, DR LESLIE CARLYLE, Head of Conservation, Tate Gallery; DR JIM TATE, Head of Conservation and Analytical Research, National Museums of Scotland, examined.

Q334 Chairman: Good morning and welcome. I am sorry you are quite so far away; they have allocated this rather grand room to us today and it does mean that the few of us here are a very long way from you. Can I say how pleased we are to have you here and also pleased to have members of the general public here? Should any of you wish, there is a short note about the purposes of this inquiry and the declarations of interest sitting on the bench; please do help yourselves to them. Given that we have two sessions today I would like to go directly into questions but before we do that I wonder if I could ask you to introduce yourselves and perhaps, Dr Carlyle, you would like to start.

Dr Carlyle: I am Leslie Carlyle; I am Head of Conservation at the Tate Gallery.

Mr Beard: I am Alex Beard, Deputy Director of the Tate Gallery.

Mr Macgregor: Neil Macgregor, Director of the British Museum

Dr Saunders: I am David Saunders, Keeper of Conservation, Documentation and Science at the British Museum.

Dr Tate: I am Jim Tate from the Conservation and Analytical Research Department of the National Museums of Scotland.

questions. Might I therefore ask you the first question? The evidence that we have received from the Department of Culture Media and Sport suggests that the Department devolves conservation science to its non-departmental public bodies and is reluctant to take the lead in setting strategic priorities or allocating specific funds. When we had them giving us evidence they said very specifically that that is a matter for the museums themselves to take a view on. Is this your experience? Would you like the Department to be more pro-active? Mr Macgregor, would you like to start?

Mr Macgregor: Certainly from the British Museum and I think most of my colleagues, that is the case. I think we feel that within the resources available to museums and galleries it is best if they themselves set those strategic priorities while accounting for expenditure and reporting on those priorities to the DCMS. I think what we feel is that the process of coordination or structure of coordination which would indeed be desirable should be taken by experts working in the field of conservation science. Coordination would be valuable but there are other models available and preferable to having it coordinated by DCMS.

Q336 Chairman: Tate Gallery?

Q335 Chairman: Thank you very much indeed. Unless any of you are burning to make a statement of any sort I would, as I say, quite like to go into

Mr Beard: I fully support that. I think that it is an advantage that we can take a view about what the appropriate level of investment in research and

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development and conservation science is relative to the very particular needs of our collection. By example, this week we have a conference looking at the performance of modern paints, *Modern Paints Uncovered*, and that comes straight out of a direct concern about how such media will perform over the next century and therefore a very direct need to explore that. The DCMS is I think best placed to facilitate, as Neil was suggesting, a co-ordinated approach across museums and galleries and the research councils, particularly now that AHRC has come into the frame. I think that is very much where we would like to see coordination and funding for conservation science come forward, building on the entry of AHRC into the field.

Q337 Chairman: How about Scotland, Dr Tate?

Dr Tate: The situation is a bit different of course because although conservation science is not a strategic objective for the cultural policy division of the Scottish Executive it does feature in the National Museums' corporate plan and that of course is approved by the ministers as part of the care of the cultural collections. The Scottish Executive has produced this year a cultural report which sets out their aims for closer collaboration between the national collections in Scotland and that does give some broad guidance. If I may quote, it says it will, "allocate future resources to best achieve national priorities for the conservation of collections and improvement in public access to them". They are giving a responsibility very clearly to the national collections to sort out the actual strategy which will deliver the best conservation and therefore it is for the museum really to demonstrate that conservation science is a key bit of that best practice.

Q338 Chairman: In relation to England are there risks of the DCMS washing its hands of conservation science? For instance, is the importance of conservation science adequately reflected in strategic priorities? There is a bit of a rumbling going around—there was an article in *The Telegraph* I think on Friday—indicating that perhaps too much emphasis has been put on access and not enough on the priorities of conservation. How do you feel about these issues? Is there a risk that in the absence of leadership from the Department that institutional allocation of funds to conservation science is going to be squeezed too much?

Mr Macgregor: I think there is certainly a risk of research of all sorts being squeezed as budgets are squeezed. We have been told that for the next three years the best we can hope is flat resources, possibly a decline in real terms. For anybody having to manage a museum or a gallery budget research is obviously one of the areas you can most easily cut

back on because the impact is not immediately visible. I think there is a real danger to research in our institutions. I think we would all feel that there should be a champion for research in museums and galleries. We believe that champion would best be situated in research councils, perhaps ideally in a joint venture by the AHRC and perhaps the EPSRC making it clear that it is a humanities and science joint venture. That is where we feel the leadership, championship and the devising of a coordinated strategy should lie.

Mr Beard: I completely agree.

Q339 Lord Broers: We have really been discussing this already but let me ask specifically, is there a need for an overall strategy for conservation science and research, both in England and Wales and in the wider United Kingdom? If so, what would be the best way to develop such a strategy? You have just mentioned that you could have a champion in the AHRC and EPSRC but what about the overall coordination of this work?

Mr Macgregor: I think there is a valuable model for a coordination of research between national museums and non-national museums and the wider community in the Portable Antiquities Scheme which now I think provides a very clear structure for coordination and for dissemination. That is run by archaeologists; at the moment it is based in the British Museum. The different aspects of it were put together and the different areas were open to tender. We believe that it would be worth investigating whether a comparable scheme coordinated, perhaps led by one of the national museums (and perhaps that could be decided by tender), funded by two research councils so that there would be a structure for coordinating national priorities and responsibility for disseminating the results not just to the academic and scientific community but to the conservation community and the wider public. We think there is almost a model in existence that could be transposed to the field of conservation and science.

Q340 Chairman: The Portable Antiquities Scheme has really worked extremely well.

Mr Macgregor: It has worked beyond anybody's expectations, particularly the way it has involved national museums, regional museums, finds liaison officers and the amateur community or the non-professional community. Yes, I think it is a good model.

Q341 Chairman: In Scotland, Dr Tate, from what you were saying in answer to the earlier question, as I understand it the Scottish Executive has agreed with you a broad corporate plan here.

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Dr Tate: That is right. I think one of the issues that concerns us very much is the national role and how conservation science is composed both of important new scientific research but also delivering a lot of much more routine applied science to practising conservators throughout the community, so it is at all levels. Certainly the cultural report of the Executive implies that national collections should have as wide an outreach as possible in providing services and specialist resources, but of course that is pretty difficult to do with the existing resources. I think that is a real point, resources to provide more routine conservation science, the output of conservation science research is an important issue.

Q342 Lord Sutherland of Houndwood: In Scotland of course your responsibilities are devolved responsibilities but those of research councils are not. Would that cause a tension? I could see ways of trying to make it work but it would require effort.

Dr Tate: I do not think it does with the research councils because I think they are primarily concentrating on the overall research aspects which we would hope would be the same across the UK. I think it is the delivery of the more applied services which would have to be funded in a different way.

Q343 Lord Sutherland of Houndwood: So Scotland would be content—indeed, perhaps very happy—to be part of a UK-wide scheme involving the research councils.

Dr Tate: I am sure that is right.

Q344 Lord Broers: You will be aware that there is a recommendation of the Office of Science and Technology that DCMS should appoint a chief scientific adviser. Do you see a role for this person in developing a national conservation science strategy?

Mr Macgregor: I think that role would be better located in the OST for the reasons I have said but for two further reasons. Firstly I think it is important that any strategic structure should be run by people who are experts themselves and are in contact with other experts and I do not think that expert context would exist in the DCMS. Secondly, I think it is important there be a champion for the funding of this activity which is separate from DCMS because DCMS budgets are fixed and perhaps declining as we have been told to prepare for. It would be hard for someone inside DCMS to defend that. Also I think the other area where it would be valuable if this were in OST would be the role that could be played in European Union and Brussels discussions where the experience of all of us is that the UK has failed to play the part it could play in shaping the EU's strategic initiatives. I think OST and DTI are demonstrably

better placed to exercise influence in shaping Brussels initiatives.

Q345 Chairman: Can I put it to you that your core funding comes from DCMS and unless you see little in the way of your core funding going to conservation science it would be appropriate for DCMS to play some part in this. It is all very well to be shifting the responsibility onto OST and the research councils, but DCMS surely should be playing some part in this.

Mr Macgregor: Of course they should, but I think the analogy would be historical research which is another core part of our activity and indeed funded by DCMS. They play no part in setting strategic priorities for that; those are discussed in the context of AHRC and other academic groups and that I think is proper. The role of DCMS I think is to fund what is a core activity of a museum or gallery—academic research, scientific research—and to have us account for what we do, but I think the strategic goal setting in those specific areas would perhaps be better done by experts in those areas.

Q346 Lord Broers: This might be especially the case too because it is likely that DCMS will appoint a social scientist.

Mr Beard: I think from our point of view that would be the most appropriate course of action in that there are a number of social science issues which are absolutely essential in terms of DCMS's function, not least thinking about the evidence base for the impact of cultural participation. Those are social functions for the DCMS. I think, however, that whoever the person is who is appointed to that role they need to be an advocate for science more generally and have a clear understanding of the potential application of it to our core purposes. I think, just echoing Neil's comments, that for us the key role of DCMS is to be our funder, our regulator and therefore apprised well of all of the aspects of a museum's operation, and an enabler. I think it is that catalytic, enabling role that the DCMS can play but I think in terms of goal setting and strategy setting that is best placed within OST or better met through the concerns of the museums and museum umbrella bodies.

Mr Macgregor: One of the reasons for that I think is that a lot of this activity will involve alliances and partnerships with bodies not funded by DCMS but within the purview of the OST. That seems to me the key reason why the strategic goal setting should be done by the body that has the widest range of links with the partner institutions.

Q347 Lord Broers: The Museums, Libraries and Archives Council is currently developing a Research and Evidence Strategy. Do you see a role for the

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MLA in the development of a national strategy for conservation science?

Dr Tate: That is national? The MLA does not of course cover Scotland.

Mr Beard: MLA has a role as a stakeholder, the distributor of funds to regional museums and a key sectoral body. I do not think that it is well placed to take the lead in such matters partly because of its particular focus on regional museums; it does not take account of the concerns of national museums by the nature of the expertise that it has at its disposal. I think that that is properly distributed throughout the sector. The MLA has a role but I would not say it should play the lead in this instance.

Mr Macgregor: The fact that the MLA is not a United Kingdom body is a very important aspect of this. We must have a national museum scientific research strategy which is national for the whole of the UK I think. I would echo Alex's point that MLA's role, I should have thought, is to ensure that the regional museums with whose funding it is involved have the capacity to participate in these activities.

Q348 Chairman: When you say a national strategy, you mean a UK strategy.

Mr Macgregor: I mean a UK strategy, yes.

Q349 Chairman: Are you happy with that, Dr Tate?

Dr Tate: With a UK strategy, yes.

Q350 Chairman: As a matter of interest what proportion of your core budgets do you devote to conservation science?

Mr Beard: If I could speak for the Tate, we invest round about five to ten per cent, depending on the year, and our success in securing external funding of our overall conservation spend on research and R&D initiatives. The conservation spend as a proportion of our total spend is in turn around about ten per cent of our total spend.

Mr Macgregor: Ours is slightly less, about seven or eight per cent of total spend. Again, to go back to the point about the squeeze on research, the British Museum recently had to retrench quite profoundly, as you know. The consequence of that was the research complement had to be reduced from 23 to 15 within the last five years. I think this is really the problem for the future that if budgets are set to shrink the scientific and research areas are going to be disproportionately affected.

Q351 Chairman: And the National Museums of Scotland?

Dr Tate: I am afraid I do not have the actual figures as part of the overall spend. I think it must be around five per cent if we take account of equipment, capital

costs and their depreciation to actually run laboratories.

Q352 Chairman: Can I come back to the British Museum? You were saying it was seven to eight per cent of your overall spend. Is that conservation as a whole or conservation science?

Mr Macgregor: It is conservation and science together; the two together.

Q353 Chairman: Do you have any idea what proportion goes on conservation science which is, I suppose, largely salaries of those who are employed in the field?

Dr Saunders: The proportion of the conservation and science budget which is for science is around about 20 to 25 per cent but that covers not just conservation science but all science in the museum. Of course part of that is directed at science in the service of curatorial inquiry and elucidation of materials, techniques and cultures through the material technology.

Q354 Lord Sutherland of Houndwood: May I continue talking about money? There are two aspects to how you spend your money and I see what the pressures are under which you are living. One clearly is the staff and we have heard the worries you have about reduction in staff. We also have a question that keeps coming up about how we maintain an adequate pool of trained and efficient and lively members of staff because in a reducing market that becomes very difficult. The other question I would like to turn to in a moment is this equipment, but could you talk a little bit about staff and what the long term picture is for having enough people to do the job?

Dr Saunders: I think the issue here is that there is no clear path for people to come into museum science or into conservation science. There is no training course in the UK for this and it is often a job to get bright young scientists interested in the field when the salaries are not particularly competitive and when subsidised places for them to get a taste for what a career in conservation science might be like are not available. We are exploring various avenues for this, but these are outside the general funding schemes that come from government; they are largely through private foundations and through European funding.

Dr Carlyle: It is very much the same situation for us. We rely on outside funding in order to support a lot of the work that we do in the conservation department in conservation science. We have managed to hold onto highly skilled individuals through a series of grant applications that will run for two or three years at a time but it does not provide job security for them.

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Q355 Lord Sutherland of Houndwood: Can we pursue the question of outside funding? What are your natural sources? How well are you doing research councils, foundations and Europe? How much money is coming from that corner?

Dr Saunders: We have had collaborative projects with universities. It is quite a recent event that we have had the ability, through analogue status, to apply in our own right and I think through our Research Board at the British Museum we are now beginning to explore that possibility. In collaboration with universities one has to bear in mind that their research agendas are often driven by their own needs and those of the research assessment exercises to which they have to subject themselves. We have had experience with collaborative European projects but these have been less prevalent in the last few years and often have again been driven by particular agendas which are not necessarily those of the museums and the conservation science community. Then there is the possibility of private funding from large foundations or companies, who will undertake to support a piece of research, but this tends to be in isolation, so that continuity is very difficult. One tends to pursue an area of research, find it is promising and then one is faced with that big decision whether or not it can be made a part of one's core activity at the expense of some other activity.

Q356 Lord Sutherland of Houndwood: Yes, for sustained project funding of that kind you need a decent core that will carry the thing through. Connecting that point with staff development, is there any room at all for staff exchanges with European foundations and institutions? Again that is a way of people extending their range of skills without having to go on a paid course.

Dr Saunders: There have been exchanges of this sort in the past. Unfortunately they were in rather less straightened times, but we are looking at the possibility of using schemes like the Marie Curie Foundation money through European intervention to exchange staff between institutions. We are hoping to pursue that, certainly at the British Museum.

Dr Carlyle: That is very much the case with us as well. We are looking into exchanges and hoping to also offer new career development opportunities for people in the UK to come and work with us for a certain length of time but again we will have to go out and find funding for that.

Q357 Lord Sutherland of Houndwood: To hang onto the European funding issue, clearly the 7th Framework and its definition will be very important for you. Are you offering any forecasts of what will happen there and the implications of it?

Dr Saunders: I think, going back to the point that Neil Macgregor made, the lack of influence at the crucial stages of deciding the framework means that there is perhaps not as much in it as we would have hoped for. Obviously we will be looking very carefully to see how we can take best advantage of it, but I am not optimistic about the potential for us.

Q358 Lord Sutherland of Houndwood: Will that hit the core or the edges, so to speak?

Dr Saunders: I think it will be at the edges but our experience with European funding in the past is that it has often allowed us to finance those areas of research that we could not undertake with our core funding but which have, in time, proved to be the developing areas that become our core.

Q359 Lord Sutherland of Houndwood: May I ask about equipment which is really rather important? Do you do any equipment sharing? Other institutions have begun to learn the benefits of this, especially if you are looking for expensive or complex or state-of-the-art equipment? What is the state of play in maintaining your equipment?

Dr Saunders: The purchase and maintenance of core equipment—there are certain pieces of equipment which we feel it is necessary to maintain on site, which are the workhorses of our research and analysis in support of curatorial and conservation questions—is very problematic. These are expensive pieces of equipment and we have no on-going funding for them, so we have to fundraise on a case by case basis the funding required. We have begun to explore the possibilities of sharing both with universities and with other national museums. We already have arrangements with sister institutions within London for sharing certain pieces of equipment and the expertise to use them for small projects. Clearly we would like to broaden the range of that and potentially through a co-ordination of strategy within the museums one could see more formal arrangements of this sort established.

Q360 Chairman: Can I take you back to the training of research scientists and the need to renew the current generation of people? English Heritage on the craft skills side are now working with the sector skills councils and the learning and skills councils to try to get a core of young people trained in these practical craft skills. We were talking earlier about the role of the research councils and the development of research strategies in coordination with the research councils. They have run for many years in science a very successful scheme called the CASE Scheme where they supply the funding for the training. I wonder whether you might explore a similar training

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scheme with them in relation to conservation scientists.

Dr Tate: We have participated in several CASE award schemes which have been very successful in focusing on one particular research topic in a partner university. There are two issues really, one is that even for the CASE awards the institution has to put up some money and that can be quite significant against the budgets that are available. Secondly, for them to be successful the project does have to be very focused—which is very good—on the science, it has to be delivering good quality science to get a science degree (a higher degree very often) at the end. That is a very good avenue but it is not addressing the question of what happens next.

Q361 Lord Sutherland of Houndwood: There is one last point about European funding that I wanted to ask. You implied that somehow we had not had enough influence in the formation of the principles of the 7th Framework Programme. Whose responsibility is that?

Mr Macgregor: I have to say that it is quite difficult to know. My experience has been more on the art historical side rather than the scientific side, but it is clear that the way UKrep works and the UK input into programmes in the Culture Directorate General is not properly coordinated, it is not discussed with the museum community or the art historical community in Britain and therefore the programmes that emerge in that area are often ones of very little interest to us. I think it is another reason why we feel that the OST is the right place for this because the DTI is much better placed to coordinate that, but I think it is an urgent issue of how the UK shapes the programmes.

Q362 Chairman: Did you bring any pressure to bear on OST in relation to this?

Mr Macgregor: I have not been involved in the 7th Framework.

Dr Saunders: There was considerable lobbying of the DTI at the time from various museums and academic institutions that have an interest in this but they largely went unheeded.

Q363 Chairman: I take it there was lobbying from academic institutions about conservation science, was there?

Dr Saunders: About the lack of a programme to look at the scientific research in the heritage sector.

Q364 Chairman: Did you use your relationship with DCMS to get them to bring any pressure to bear on OST?

Dr Saunders: We did not explore that route to OST.

Q365 Chairman: Would that not be appropriate? In a sense you were saying to us that your line management is DCMS. Departments do talk to each other but we know perfectly well that joined-up government does not work that well. You are major public institutions in this country, surely if you are unhappy about this you should actually make it known that you are unhappy about what is happening.

Mr Macgregor: In general terms the NDPBs have raised with DCMS the issue of how properly to ensure that UK cultural interests are taken account of in shaping EU programmes. The DCMS has I think now got somebody who is responsible for coordinating that. I think it is a big task and I think it is fair to say that everybody feels it could work better and in general we have articulated the concern.

Mr Beard: That is a fair point. If there is a lead taken whether it is by ARHC or as a joint venture between ARHC and EPSRC taking ownership of conservation science as a discipline and its concerns then that would create a clear locus for such advocacy with Europe and so on which you identified earlier in the discussion. I think that is essential to improving the attention that is given to the issue.

Chairman: Yes, but within the research councils the weight of the scientific views are very strong and you have to make your voices heard. I think we should move on. Lord Chorley?

Q366 Lord Chorley: Can we move on to another area? It has been suggested to us that in the past there was insufficient support for the national museums to justify establishing a national conservation centre and we ask ourselves, do we now need to revisit this idea either in the form of a physical centre or, perhaps more interestingly, a virtual centre? Certainly the Tate Gallery had some interesting things to say on that in your evidence.

Dr Carlyle: Prior to coming to the Tate last autumn I worked for the Canadian Conservation Institute for 25 years and in a central facility in a country like Canada with a small population and a vast land mass this made a lot of sense. It was initiated in the early 1970s when there was no particular infrastructure for conservation in the country. I do not think it makes sense for a physical entity to exist in the UK such as this but the virtual idea does make sense. One of the things that does exist very well in this country is a pre-existing network of conservation scientists so it would be not insurmountable to create this type of a virtual network. One of the things we were hoping to do at Tate is to develop a centre of excellence for the study of materials and techniques of artists and art

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works and that would involve creating a focus point for many partners to share the facility.

Q367 Lord Chorley: I am sure Scotland would be more interested in virtual centres.

Dr Tate: I am sure there are real advantages and possibilities for virtual centres if they can be resourced so that they can deliver. They would have to have the funding.

Q368 Lord Chorley: Moving on, we have been told of the extensive informal contacts about conservation scientists yet the links with the wider world of scientific research appear to be weak. It is almost like a closed community, one might say. Is there a risk that in the absence of a more structured network or centre, museum-based conservation science may become increasingly parochial or even insular?

Dr Saunders: I think that is a risk but I do not know that a national centre is necessarily the solution. I think this very much depends on the amount of contact these museum scientists have with those in the wider community through links.

Q369 Lord Chorley: Contact at conferences or what?

Dr Saunders: If this idea that we have of some kind of virtual centre based on the Portable Antiquities Scheme model existed, that could be a centre that would allow the contacts to be made with the outside world, with the academic community and then those contacts pointed in the direction of the most appropriate scientists within museums with interests in that area. The slight issue with the national centre is that a lot of the work conducted in museums is very collection-focused and that work, I think, would probably have to remain within the individual museums because it is in support of those individual collections. Where I think it might have a place is for a part of the work done by each museum to be pooled centrally; the work that is of common interest to the community might then be carried out in conjunction with outside researchers and this virtual centre would be a proper place for that liaison and those contacts to be established and maintained.

Q370 Lord Chorley: Presumably you would get more specialisms. A particular gallery, collection or whatever might have developed a particular speciality in some form of conservation science and this would provide a focal point for that sort of approach.

Dr Saunders: For example, the British Museum has a very small collection of easel paintings so it probably does not make sense for us to develop a great expertise in easel paintings, whereas through links with other museums and through a centre or informal

links if such a centre is not established, we would take advantage of the expertise that exists in those collections which have large easel painting collections, and vice versa. Where another museum has a few objects which we have a large representation, they would turn to us for expertise in those areas of research.

Q371 Chairman: Would you welcome more centres like the Southampton Centre, the Textile Conservation Centre?

Mr Beard: Yes.

Q372 Chairman: That is an academic based centre but in a sense brings together expertise in this particular area as I understand it.

Dr Saunders: Yes.

Mr Macgregor: If I can just add, I think it is that notion perhaps not so much as a virtual but as a distributed centre or a conservation centre of excellence which is of great merit that builds on our existing core strengths.

Q373 Lord Chorley: Is there a process for disseminating the results from your research and developing best practice in conservation?

Mr Beard: To give one very topical example, we have a conference this week on the performance of modern paints and of the 250 delegates attending 55 are in private practice; those 55 will serve a range of clients including regional museums and there will be seminars, publications and events associated with the conference. We are very conscious that the work that we do is highly applied and that the results of our endeavours need to be widely disseminated.

Mr Macgregor: The same could be said for the British Museum with metallurgy, for instance, where I think the conferences are attended by everybody in the country in regional museums working in that area. Probably at the professional level of regional museums there is a very strong and effective network of sharing information.

Q374 Lord Chorley: What about private collections?

Mr Macgregor: I think there is a much bigger question there about how the scientific material is made available to a non-academic/non-scientific community.

Dr Saunders: I think the private collections are generally serviced by the private conservation community and the dissemination of results is generally through conferences and through publications. There are publications such as *The Conservator* in the UK and *Studies in Conservation* internationally which take scientific results and present them to conservators. These are quite limited in that the number of articles published in a year is

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finite, but they are a means of making current research available. I feel we can do this better. There is always this question of publishing for two communities, because at the same time the scientists are attempting to communicate the results to conservators, they also, to retain their standing and their credibility within the scientific world, need to publish those results in a different form targeted at their peers within scientific disciplines. It is, as ever, a balancing act; we exist between these two communities.

Q375 Lord Chorley: I am getting the impression that there probably is a problem with private collections both in terms of disseminating information to them and maintaining contact, and whether the owners of the private collections are really capable of funding the work that needs to be done.

Mr Macgregor: I think the Historic Houses Association at least has done quite a lot on this and certainly the Historic Houses Association and the National Gallery used to work together on painting conservation so that owners who had works that required attention might get rapid expert advice. I think with the National Trust also, most owners would know where to turn for advice. Funding is a separate issue. I think most owners through either Historic Houses Associations or the National Trust would have access rapidly to informed advice.

Dr Carlyle: I am just thinking about the National Trust *Manual of Housekeeping* which they have just put out which is a revision and very much the latest information coming through conservation science will percolate into that publication so it is a form of dissemination in itself.

Lord Chorley: In my day it used to be one of the best sellers.

Q376 Baroness Finlay of Llandaff: Dr Saunders, you have already spoken a bit about the different priorities of those working in museums and galleries and those working in the university sector. I wonder, as a panel, if you could outline what steps you have been taking actively to encourage collaboration of research projects with universities so that you in the museum sector can gain access to the best scientific expertise and also to equipment that is held in the universities.

Dr Carlyle: I can speak on that from the Tate's perspective. We have had a long standing tradition of having our conservation scientists trained through being registered at a university and being trained at Tate at the same time. We currently have 3.4 staff and two of them were trained in this way by Tate identifying an area of interest which, in the first case was a Turner bequest, and then allying with the Courtauld Institute of Art in creating a PhD level

funding for it through the Leverhume Trust. That person was educated between the two institutions, got their PhD and then carried on to work for Tate. It is the same thing with our modern materials; that was the same type of situation where we identified the issue and we partnered with a university and then we were able to hire the individual at the end. This has been a very good model for us and it means we have very close contacts with the universities. We have recently got a large grant from the Public Sector Research Exploitation Fund and we have two PhD candidates starting very soon who are both registered at UK universities. So it does work for us.

Q377 Baroness Finlay of Llandaff: Can I just about the Arts and Humanities Research Council because it is championing conservation science with the research councils. You have already spoken about analogue status, but are you satisfied that the Council is capable of offering access to cutting edge pure science?

Dr Saunders: I think we have doubts that it can. Certainly for the British Museum one of the approaches we are taking is to use the fact that we now have AHRC and NERC analogue status to approach EPSRC to complete our hat-trick so that we can genuinely go across these boundaries in terms of finding funding for scientific projects based on questions that arise in the museum. In terms of how we identify these, I think what we need to look for realistically are projects that satisfy both our aims and those of the universities, because I think this has to be a mutually beneficial exercise. So we need to look for programmes of research which are useful for the museum and which would form the basis for a research project that would allow someone to receive a PhD at the end of it. Then we would approach our contacts within universities that are interested in this sector and have the expertise, with a view to setting up these joint projects. Analogue status is extremely useful because we are not now in the situation that Jim Tate described where we have to put money in as part of a CASE studentship; we are equal partners with the university in this process.

Q378 Baroness Finlay of Llandaff: Do you see that there would be merit in establishing a dedicated cross-research council funding stream for conservation science?

Dr Saunders: I certainly feel it would be useful but I do not know whether it is a large enough sector for them to develop a dedicated funding stream for that area. It is a question I cannot answer but we would certainly encourage it.

Mr Macgregor: I would like to comment on something David said. I ought perhaps to declare an interest that I am on the board of the AHRC. To go

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back to your first question, one of the reasons that the AHRB was so pleased to move to a council status was precisely that it brought the AHRB within the ambit of the OST and the other research councils. This kind of cross-over to the scientific research areas will be easier. I think the AHRC is already moving in the direction you talk about. The focus on conservation science, scientific research through the AHRC for museums is another example, but I think all this points precisely to what we were arguing that the coordination and ideally the funding of this should be in a cross-research council, ideally all three research councils.

Q379 Baroness Finlay of Llandaff: Quite separate to research but linked in with it, I am wondering if there is a need for you to be able to access some of the high quality equipment that universities may be holding for research projects but that you will need to access for the on-going conservation work that is undertaken.

Dr Tate: Some of those are available in collaborative projects with universities. We can use the synchrotron for example or other high-tech facilities. If the project is good enough then it is not that difficult to attract partners who want to engage in that kind of work and that can be very successful.

Dr Carlyle: It does tend to take a lot of effort though to coordinate this. Before I joined Tate I was working in the Netherlands. The Atomic and Physics Institute has quite a lot of complementary state-of-the-art instruments that they made available for, in this case, paintings conservation science research and having all of the instrumentation in one place calibrated for the needs of those projects was extraordinary and very, very useful and it meant that people were not having to go around and beg, steal and borrow time on various different instruments across a large number of institutions. In fact, they were all in one place and they could be harnessed for the use of conservation science; it was a very special occasion and that would be a wonderful thing to have here.

Q380 Baroness Finlay of Llandaff: Whereabouts in the Netherlands?

Dr Carlyle: It was at the Institute of Atomic and Molecular Physics and the Netherlands Government was pouring money into conservation science research for the last ten years. Unfortunately that institute, because it is a physics institute, has now decided not to continue that programme so it is ending in fact, which is very sad. It does mean that it is a unique opportunity for it to be picked up elsewhere.

Q381 Chairman: I think the central laboratory for the research councils has indicated that it is extremely happy to work in the arts area on conservation science

and you do use them, as you say. That will be moving down to Oxford but I take it you will continue using it there.

Dr Tate: There is also a synchrotron facility in Switzerland.

Q382 Chairman: Does analogue status with one research council give you equivalent analogue status with another research council? Do you have to apply for it separately for different research councils?

Mr Macgregor: As I understand it you need to apply separately for each research council.

Q383 Chairman: Have you got analogue status with the EPSRC?

Mr Macgregor: Not yet.

Q384 Chairman: You are hoping to acquire such status.

Mr Macgregor: The British Museum has analogue status with AHRC and the NERC.

Dr Carlyle: We are on AHRC.

Dr Tate: We are on NERC but actually at one these meetings we were quoted as being EPSRC as well.

Q385 Chairman: Can I finally ask you about the international perception? How is UK conservation science perceived at an international level? What are your reactions to that?

Dr Carlyle: Perhaps I could add to that with my non-UK accent. It is very highly regarded internationally and it is actually taking the lead in conservation science because very many of the people who trained here or who come from the UK have been embedded in many institutions, certainly in North America and there are a number in Europe as well so it has had a very high standing. Of course the International Institute of Conservation was founded in the UK as well.

Mr Macgregor: I think it is fair to say that it is very highly regarded indeed. If you take the examples of the paintings at the Tate and National Gallery, what is very much admired is the way the research and the conservation and the curatorial investigation work together. The scientific research has led to a deeper understanding of the objects, not just their conservation. In the fields for which the British Museum is responsible, again in areas like metal conservation particularly—archaeological metal—I think its position is very much as a world leader. Therefore I think one of the responsibilities we feel as a museum community is that there is an inherited position of very great strength and an international role which the UK museum community has played for many years and which the international community wishes the UK to play which does need to be thought about for its coordination and funding.

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Q386 Chairman: If that is so, do you feel that the public perception is sufficiently aware of this area of expertise on the part of Britain? Ought you not to be trying to raise the profile of conservation science rather more amongst the general public?

Mr Macgregor: I think the easiest area always for this is paintings because they have the highest level of public exposure. Alex will talk about the Tate, but at the National Gallery the production of exhibitions focused on the activity of the conservation and the scientific teams are very popular exhibitions, television programmes on these areas are popular. I think there is a wide public fascination with this and interest in it but I think the public understanding of the need for it and the quality of it is already quite high.

Mr Beard: It is increasingly a dimension that we add to interpretation of our particular objects, whether through the use of hand-held multimedia guides which have access to deeper information including fundamental techniques and materials. Also we disseminate information on line and we have made a number of publications which have been successful in their own terms, and specific displays which engage with the techniques, materials and then scientists giving advice on the object is a very important part of our activity and one which the public is immediately interested in.

Q387 Chairman: I think that is certainly so and in terms of public access this is a very important route into getting general interest in the different areas. The

issue I was more concerned about—it comes back to some extent to this whole question of OST, DCMS, EU funding—given that this an area of expertise is there a problem that government does not recognise this as a very important area of expertise where UK science needs to be encouraged and re-generated to some extent?

Mr Macgregor: I think it is part of a larger failure in the UK to invest in the museums and galleries across the board. If you look at the level of investment abroad—you have just heard about the Netherlands, but there is also Germany and France—the level of investment in the major national museums is much higher, particularly in terms of staff and expertise in all kinds of areas. It is not just the scientific research area which is relatively under-funded in European terms. It is certainly an area that we must keep reminding DCMS that the scientific research is a fundamental part not just of the museums doing their research work or conservation work, but also making the collections understandable to the public.

Chairman: Thank you so much. I think we should bring this session to an end now but in doing so can I thank you very much indeed for coming and being so open with us. We have been putting some quite tough questions to you but from our point of view it has been extremely useful. Should you wish to supplement anything you have said in writing, please do not hesitate to do so. Anything you send in writing will be published alongside the official record of this session; you will be receiving a draft of this in due course. Once again, many thanks for coming; we have had a very useful session.

Supplementary Memorandum by the British Museum

Draft proposal for a conservation science hub to co-ordinate distributed research

The written submissions and oral evidence presented to the enquiry on “Science and Heritage” by the Science and Technology Select Committee has emphasised the cross-disciplinary nature of the research conducted by conservation scientists. The field is at the interface of the arts and sciences; scientific examination, analysis and research inform an understanding of material culture and the susceptibility of artefacts to change, while historical, archaeological and art historical research place these results in the context of place, period, practice and belief—a two-way knowledge transfer across this often problematic interface.

Most conservation science is conducted in the laboratories within the major National Museums and Galleries, where scientific study is embedded in the context of the cultural heritage it seeks to elucidate. While it is best to retain these individual laboratories, as their work is intimately associated with collections and their particular needs, there are benefits associated with a more formal co-ordination of this network of leading institutions to produce a national strategy for research and a sharing of distributed resources.

Such a strategy for science in the field of cultural heritage should be UK-wide, encompassing the National Museums and Galleries in Cardiff, Belfast and Edinburgh as well as those in London and Liverpool. While the remit of DCMS extends to museums and galleries in England, it does not cover institutions in other parts of the UK, nor does it cover other bodies, such as the National Archives or the National Trust, which conduct valuable research in this field. Crucially, as it has no links with universities, support for co-ordination of distributed science research would therefore best come from the UK Research Councils, which have a UK-wide remit and support research in Universities and other analogue bodies including many UK museums and galleries.

Co-ordination could be achieved by establishing a conservation science research hub, focusing on both the elucidation of the materials and techniques of antiquities, artefacts and works of art and on the examination of deterioration processes, their amelioration and the conservation methods used in their treatment. The hub might act as point of communication between the participating (conservation) science departments in National Museums and Galleries, University researchers active in the field of conservation science, regional museums and private conservators. It would have a role in the dissemination of information about conservation science through increased public understanding of the field and its benefits for the cultural heritage. Furthermore, it would gather and distribute to its participating institutions, information on calls for funding and collaborative projects.

This hub could be based on the model of the Portable Antiquities Scheme. The co-ordination of distributed research would be undertaken by experts in the field based in one of the participating institutions, probably one of the National museums or galleries. An Advisory Council, comprising representatives of the participating institutions and independent experts in the field might be formed to oversee the function of the hub.

Funding this venture, not through an increase in Grant-in-Aid to museums and galleries from the DCMS, but through an approach to the AHRC and EPSRC, would also serve usefully to separate the function of the hub from that of the existing conservation science departments in museums and galleries. The research conducted in museums and galleries clearly plays an important part in the overall activities of the museum that are targeted towards performance indicators set by the DCMS. However, the promotion of a research hub, as a high-profile example of collaborative research and knowledge transfer at the interface between the sciences and arts, would be better supported by an independent stream of funding through a joint initiative of the major UK Research Councils in these areas, the AHRC and EPSRC.

Memorandum by the Institute of Conservation

Icon, the Institute of Conservation, is the lead voice for the conservation of cultural heritage in the UK. It brings together over three thousand individuals and organisations. Its membership embraces the wider conservation community, incorporating not only professional conservators in all disciplines, but all others who share a commitment to improving understanding of, and access to, our cultural heritage.

SUMMARY

- Conservation science underpins the conservation of cultural heritage;
- The UK's world-leading position in conservation science is being steadily eroded;
- Conservation teaching in universities is at risk;
- Science support for conservators outside the national institutions is deficient;
- The importance of conservation science in UK establishments should be recognised by government.

RECOMMENDATIONS

- Collaboration in conservation science between heritage institutions and universities needs to be fostered by the creation of a post of Co-ordinator for Conservation Science Research Funding;
- Conservation and conservation science should be better recognised within the Research Assessment framework;
- Funding should be allocated to realise the considerable potential for Science, Engineering and Technology to enhance understanding of conservation and appreciation of the heritage.

1. CONSERVATION

Those working in heritage are charged with the responsibility of conserving it and with making it meaningfully accessible, for the enlightenment and pleasure of present and future generations; with maximising both its survival and its accessibility over as long a period as reasonably possible.

Since all matter is in a state of change, conservation is the management of change. Conservation is about minimising long-term risk by understanding and controlling the way in which items are stored, transported and displayed. Accepted practice is to understand the causes of degradation, to stabilise and, where appropriate, to intervene to improve interpretation; whilst documenting all observations and interventions.

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Conservation's educated and skilled practitioners generally bring layers of artistic, aesthetic, historic, social, scientific and technological awareness to the work, since these perspectives are required to inform all conservation decisions.

By virtue of their close study, revealing the internal narratives of historic artefacts, conservators play an increasing role in the mediation between the artefact and its public. The profession has increasingly taken on the task of interpreting artefacts, and thereby contributes to public access and to public enjoyment of cultural heritage. Thus it contributes materially to the income generated for the UK by the cultural heritage sector.

2. CONSERVATION SCIENCE

(Appendix B lists examples of the ways in which science underpins the many processes which make it possible to ensure the longevity of objects and collections and to make them more meaningful)

Conservation and conservation science are inextricably linked. The best cultural heritage projects today are carried out by teams of conservation scientists, conservators, curators and specialist researchers. The move towards multi-author and multi-disciplinary projects is a very clear trend of the last few years.

Conservation is largely based on material and physical sciences but also embraces other broad areas such as biological sciences, environmental science, analytical chemistry, engineering and colour science.

Although conservation has its roots in craft practice, modern conservation practice is based on the science and technology of understanding how artefacts were made, of how materials degrade, of how to slow degradation and how to reverse or correct some of its effects, using materials and processes of maximum stability.

Scientists working on heritage materials often specialise in the identification, characterisation and dating of artefacts which may or may not at the time be the subject of conservation attention. This contributes to baseline knowledge that would not be generated by any other industrial or research sector, and which is subsequently used for the treatment and study of individual artefacts. Many such scientists are also conservation scientists and/or share common cause with them. Their findings add to the narratives to which conservators contribute.

Conservation science is increasingly concerned with the environment and context in which heritage items are stored, displayed, transported and used.

3. WHERE IS CONSERVATION AND CONSERVATION SCIENCE CARRIED OUT?

The skills of conservators are applied in libraries, archives, museums, galleries, historic buildings, medical and scientific institutions, on archaeological sites and in universities. Many large collections in the UK employ conservators, but a high proportion of the smaller ones have no in-house staff and little regular access to external conservation resources. Due to a lack of local government funding, entire counties are now without any ongoing local conservation expertise to support their museums services.

All conservators ideally require the back-up of scientists. Only those working in the larger national collections have this on a regular basis.

Most conservation scientists work in the public sector. However many conservators work privately, some of them contracted in to work on public collections. Their businesses are listed on *The Conservation Register*.² They rarely have the back-up of scientists, or even access by right to analytical or testing facilities.

4. DISSEMINATION, DEBATE AND THE INTERNATIONAL PERSPECTIVE

UK conservation research led the world in the past, and in some respects still does. Yet because of static funding and limited research posts, the lead is increasingly being taken by America, Italy, Germany, France, Scandinavia or Japan. Despite this UK scientists continue to play an important role, not least in collaborative EU-funded projects.

There is an extensive body of conservation literature, to which UK conservators and scientists make a distinctive contribution. This includes:

- peer-reviewed journals such as *The Paper Conservator* and *The Conservator*, both published by Icon, and *Studies in Conservation* published by The International Institute for Conservation (IIC);

² www.conservationregister.org.uk

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- seminal books published by Butterworths/Elsevier, Earthscan/James & James and Archetype—many by UK authors;
- proceedings of UK conferences, now mostly run by Icon, and international events organised by the IIC, the Conservation Committee of ICOM, and the International Council of Museums (ICOM-CC).

In recent years British researchers have played a part in a number of international subject-specific research groups, such as the IRUG for a database of infrared spectra or MaSC for mass spectrometry data). Some of these groups have been EU funded (eg COST G8, EU-Artech).

The British Library has submitted two projects for funding to the Mellon foundation which include several European partners. Among these, The National Archives is taking the lead in advancing the material science of parchment, as well as modern archival materials and technical examination.

5. RECENT TRENDS

Skilled conservators now do less to objects but achieve more in terms of preservation. Improved viewing and analytical techniques have permitted conservators and conservation scientists to take fewer, smaller and sometimes no samples, causing less damage to get at important data.

New, treatment technologies have been invoked, safer for the objects and/or the operatives or the environment: chemical-free freezing and vacuum treatments for pest control, lasers for cleaning.

New formulations have been developed with greater scientific understanding: improved adhesives, better coatings, subtle cleaning gels for paintings, making processes less aggressive, more controllable and more reversible.

Digital technologies have opened up possibilities for more information deriving from and about conservation to be incorporated into displays, thus increasing access and engagement; and sharing of information with colleagues.

Especially in the public sector there has been a shift away from interventive (remedial) conservation towards preventive conservation. This is reflected in the research undertaken and the technologies used.

6. CONSERVATION IN UNIVERSITIES

There are no masters programmes dedicated to conservation science in the UK. The last one, at De Montfort University, has been discontinued. Both for UK postgraduates and for international students who might have wanted to come to the UK, there is no longer a domestic choice. The nearest alternative may be a distance-learning programme, planned by the University of Bologna.

A university degree has become the primary route for entry into the conservation profession. There are undergraduate conservation programmes at some 15 UK universities, proportionately among the highest number in any country worldwide. Most of these teach a distinct specialist area of conservation, such as textiles, paintings, stone, wall paintings or archaeological objects. The subject is taught at graduate and more often at post-graduate level. These programmes attract students from overseas, often in greater numbers than UK students. The number of research students is relatively small, in part due to the difficulty of funding them (see below). The subject often sits within art, history or archaeology departments or schools, and is rarely free-standing. All programmes include relevant conservation science, often sharing teachers with science departments, occasionally having a dedicated scientist on staff.

THE CINDERELLA SYNDROME

Conservation studies have tended to suffer in the HE environment because:

- They cross many disciplinary boundaries.
- They require intense teaching and corresponding high staff:student ratio, and have a relatively small employment market.
- With small staff complements it is often difficult to establish a strong research base or one which covers a significant range of materials.
- Conservation science often relies on alliances with a range of other science departments. This can be a strength, but is often a weakness when fighting for resources.

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The relative stability of conservation studies over the last twenty years is a tribute to the ingenuity and dynamism of course leaders and researchers. One conservation programme has just closed: Durham University, and there are fears that the aggressive accounting regimes in universities may cause others to follow. There is a case for extra protection for such courses, in defence of the nation's material heritage.

Conservation science is rarely a money-making service, so it is not usually possible to earn significant income to supplement government research funding.

Making the case for funding conservation studies and research has not been easy. Funding guidelines do not generally embrace the purpose of conservation research, namely to benefit cultural heritage, forcing researchers to couch applications in terms which may better suit the bodies' criteria than the requirement of heritage conservation.

To a large extent, conservation science consists of applied research and the biggest shortfall in funding is not in the development of a useful technique, but in its application to artefacts. Bodies such as the research councils have tended to favour "pure" research over "applied" research.

In summary, conservation and conservation science remain a Cinderella discipline in HEIs.

Allowing for these handicaps, the quality and reputation of conservation teaching within HE establishments is high. Students continue to choose this country to study conservation and conservation science, and UK researchers play an important if somewhat diminishing role on the international stage.

7. CONSERVATION RESEARCH AND SCIENCE OUTSIDE UNIVERSITIES

The development of conservation and conservation science took place more within museums and galleries than it did within universities. The British Museum, the V&A and the National Gallery were pioneers in the subject, the work powerfully driven by the day-to-day needs of their collections, and focusing on inspired individuals creating a new scientific discipline where none existed before. Some of the other publicly funded national museums and galleries have followed suit in recent decades; but local government and university museums have rarely sustained such initiatives. Glasgow Museums, for instance, lost its scientists some years ago.

Museums have real and often urgent problems to solve, arising from their primary duties to the public and the collections, but they do not have direct access to research council funding. Universities wishing to pursue research do have access to research council funding, but do not generally have the collections on which to build their research. Moreover Museums have generally been seen by universities as junior research partners, not as potential formal research collaborators.

English Heritage funds and carries out conservation science in the fields of archaeology, the built heritage and the use of its own collections. We welcome its recent Research Strategy 2005–10, embracing aspects of conservation science; Historic Scotland has focused primarily on the built heritage with an impressive range of research publications. The British Library and The National Archives are taking new and important initiatives in conservation science.

There is serious concern about the absence of a career path for conservation scientists. The worst shortfalls exist for post-doctoral research positions, and for mid-career conservation scientists. Many leave the field at these two stages, which both wastes resources and contributes to low morale among those who have committed to a long career in this sector. The lack of sustainable funding is the main cause of this.

8. RESEARCH IN PRACTICE

One of the obstacles to convincing funding bodies of the need to support conservation research has been the limited interpretation of "research". We welcome the recent shift within the RAE and AHRC regimes towards recognition of research in practice. Largely applied to the creative arts, this now recognises the important research outputs which derive from the practice of art; and it is hoped that the concept will also embrace conservation practice. This would mean recognition and funding for the research outputs which follow from the study and examination of cultural heritage items in the course of conservation, as well as the investigative research which often underpins any interventions; and would more closely ally funding to the true benefits of conservation practice.

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9. CURRENT FUNDING PATTERNS

The creation of the Arts & Humanities Research Board and latterly, the Council, has been a welcome development. It has helped to create research networks, such as the AHRC Research Centre for Textile Conservation and Textile Studies, a collaboration between Southampton University, Bradford University and Manchester University. This is a good example of cross-disciplinary working, supporting a proportion of scientific projects, researches and postgraduate students.

AHRB Research Studentships have also been welcome and effective. However, research supervisors report that the AHRB has not been sufficiently responsive to the complex nature of conservation science to which its application procedures are not well attuned; nor to the special funding requirements of postgraduate studies, where funding to support MA students (often the entry point for conservation studies) is counted by the AHRC against funding for PhD work.

Conservation research was formerly funded through the Science Based Archaeology Committee (SBAC) of the then Science and Engineering Research Council, and the SBAC continued within the Natural Environment Research Council (NERC). A limited number of grants were made in conservation but, as NERC focused increasingly on its key objectives, funding for archaeological and conservation science has become more difficult unless there is a clear relationship with earth systems science. The SBA Strategy Group within NERC was disbanded in 2004.

Other research councils which sometimes fund aspects of conservation science are the Economic and Social Research Council (ESRC) and the Engineering and Physical Sciences Research Council (EPSRC). The latter is currently funding a major programme on the impact of climate change, including that of flooding on historic buildings. Deciding on the best Research Council to approach for a complex conservation topic can be challenging. Although cross-referencing across Councils is possible it is difficult, and this requirement places an additional, uncertain obstacle in the way of applicants.

The AHRC recently decided to recognise some museums as academic analogues for funding purposes, but to what extent this will benefit the conservation science within them remains to be seen. Recognition of analogue status within the EPSRC would be a welcome further step in that direction.

Financial support for conservation research within the budgets of museum or kindred establishments has become increasingly difficult to sustain, with many of the host museums under financial pressure and required to meet targets which do not readily translate into scientific research on and for the collection. The focus is increasingly on preparation of objects for exhibition, hence marginalising research into preservation.

RESEARCH ASSESSMENT EXERCISE: RAE2008

We are concerned that smallness of the conservation sector within the broader groupings of research topics means that it may not receive fair treatment in the forthcoming Research Assessment Exercise. There are no conservators or conservation scientists on the relevant subject panels. We have made our concerns known, and hope that they will be taken into account.

10. OTHER FUNDING SOURCES

A number of conservation science posts and doctoral studies have been funded by inter-disciplinary grant-awarding bodies such as the Leverhulme Trust. However on the whole the funding regime has not fostered the right balance of collaboration between museums and universities.

The British Academy has funded archaeological projects at post-doctoral level, but its terms of reference appear to preclude other aspects of conservation science.

Other contributors to conservation in the UK include the MLA and the regional MLACs. The extent of their funding for conservation under the new arrangements is not yet clear, even less so the Hubs within the Renaissance scheme. Funding of conservation science from these sources is virtually non-existent. One of the biggest source of funding for conservation, the Heritage Lottery Fund, excludes research from its terms of reference.

Conservation science has been funded from the EU, but we continue to be concerned that the proposed terms of reference of the forthcoming 7th Framework Programme appear to exclude almost all aspects of heritage conservation.

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11. FUNDING AND COLLABORATION

Museum and similar laboratories have tended to be self-sufficient. However the breadth of intellectual expertise required to solve conservation problems, and the expense of analytical and testing facilities, make external collaboration essential.

The extent of collaboration between universities and heritage establishments has been poor. The recent change in AHRC policy might make a difference, though only in projects fundable by that Council and only for conservation science departments which successfully compete within those museums which achieve academic analogue status.

A National Centre or National Co-ordinator?

A further step forward—long argued by some—might be the creation of a national conservation research centre, along the lines of the highly successful Canadian Conservation Institute, and others in the Netherlands, Belgium and Japan. However, the moment has probably passed for such an ambitious initiative, requiring significant capital investment and dependent on continuing support in an intensely competitive funding regime. A more achievable solution might be a virtual centre, whereby, in return for additional funding, researchers agree to formal sharing of resources and expertise.

A pragmatic approach would be the creation of a single post whose prime duty would be to foster collaboration between appropriate establishments across the discipline. Funded by the AHRC on a pilot basis, perhaps for five years in the first instance, the incumbent would nurture a collaborative research environment, and help generate and guide research applications. He or she would act as a primary point of contact within the AHRC on this topic, would help researchers direct their applications to the most appropriate funding bodies, and provide guidance to applicants and secretariats for those applications which cross Council boundaries. By scanning current needs, he or she would identify gaps in knowledge and encourage applications where most urgently required. A highly successful precedent for such a post was the SBAC Co-ordinator.

12. CONSERVATION OF THE CULTURAL HERITAGE AS A NATIONAL PRIORITY

The DCMS does not sufficiently recognise the importance or the extent of research within its sponsored museum and heritage departments. This view is reinforced by the OST Science Review of DCMS, 2004. The contribution of the national museums to conservation research and its relevance for public access and engagement are largely overlooked at Government level. We support the OST recommendation for a science post within DCMS, and welcome the appointment of a Chief Scientific Officer. We hope that the postholder will become aware of conservation science in the relevant Non-Departmental Public Bodies.

We note, by comparison, that the Dutch government, through its DELTA plan, makes the conservation of the heritage a much higher priority, and this brings considerable benefits to conservation.

13. THE POTENTIAL OF SET TO ENHANCE PUBLIC ENGAGEMENT

Apart from the role of SET in making objects more accessible and their stories more evident, there is tremendous scope for using it to enhance the quality of visitor engagement. The *Turning the pages* innovation pioneered by the British Library is a classic case, now available on-line as well as on site. National Museums Liverpool's Conservation Centre pioneered the use of live inter-active TV to link an audience in the museum auditorium with conservators and the technology in their studios. The National Gallery, in its exhibition series *Art in the Making* shows how technologies in the laboratory can be translated into wider meanings in the gallery. A product which recently won a Research Councils Business Plan Competition—VEMDis™—is developing display technology which will “augment reality” to add 3D images to real-life exhibits. Variations on such technologies are undoubtedly round the corner, using laser imaging combined with x-radiography, analytical mapping, electron microscopy and limitless computer power. Researchers and conservators need encouraging to provide such insights, not least with targeted grant funding and dedicated staff. Such funding should be additional and not at the expense of other conservation research.

We also propose targeted funding to enable permanent arrangements along the lines of the Liverpool project—namely bringing the studio via video-link to visitors in the museum auditorium, to visitors in the gallery itself and possibly also to visitors at a distance, on-line. The concept could be of going on-line to see live progress in the examination and conservation of an artwork in the studio, complete with the conservator's

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and scientist's commentaries. More work is need on conserving the artwork in the gallery, or at least explaining face-to-face with the help of appropriate SET. The British Library's Centre for Conservation, now under construction, has received funding from HLF specifically to present conservation to the public.

SET could be used in other ways. It could be used to reproduce the sounds of early musical instruments without their having to be played repeatedly. The Horniman Museum is already using this approach. Many other technologies might be deployed to bring static displays of artefacts to life and to evoke their former uses and contexts without putting them at risk.

SET approaches could be seen as a complement to conservation technology, as a route to accessibility.

November 2005

APPENDIX A

Response to the call for evidence

CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

1. Conservation science does not stand alone but is integral to the preservation and appreciation of cultural heritage. Amongst heritage professionals, conservators and conservation scientists work most productively in close collaboration.
2. Despite the excellent record of UK conservation research this is threatened by inadequate collaboration between the users of that research (conservators and their curatorial and other colleagues) and the researchers (conservation scientists).
3. Some of best collaboration is to be found where there is a critical mass of researchers. The collaborative AHRC Research Centre for Textile Conservation and Textile Studies sets a pattern which could be emulated.
4. Many conservators have inadequate access to research facilities, unless they work in the primary national institutions. Conservators working in the private sector (over half) have very little access to such research expertise and facilities.
5. Conservators working outside the national institutions and those working in the private sector (over half) have inadequate access to conservation science facilities.
6. We reiterate our recommendation for a co-ordinating post.
7. DCMS should recognise the centrality of conservation within the bodies it sponsors; and should work with other Government departments, eg DfES, the OST and the ODPM to ensue that conservation of heritage is fully taken into account.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

8. Our impression is that the funding is less than adequate and may not always be directed at the right areas. A formal analysis of the state of preservation of the heritage and of its actual and potential use for public engagement, measured against current resources would provide a more secure answer. Investment in such research would establish a framework for heritage preservation for many years hence.
9. In-house conservation and conservation science has suffered from (a) the growing pressure on public funding for heritage organisations and (b) a shift in emphasis towards public access initiatives in which care and presentation of heritage items are no longer central.
10. We welcome the AHRC's designation of academic analogues; though we are concerned that some pre-eminent research centres have been left out of account. It remains to be seen how this initiative nurtures conservation and conservation science within the overall research work of those organisations. We also welcome the most recent indications of AHRC priorities, in support of conservation, as outlined in their consultation on Museum Strategy.
11. While AHRC is the most immediately relevant source of funding in this arena, other research councils, such as the EPSRC, should be asked to expound their policies with regard to heritage preservation research.

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12. Training opportunities for conservation science are minimal within the UK, and the skills base is relatively small and un-confident. A suitable focus should be sought among existing conservation HE centres. Such a focus should be broad-based, across more than one discipline, material or area of specialisation. DfES and HEFCE should be brought into this discussion.

13. We welcome the recent initiative taken by the University of Bologna at Ravenna as part of the EPISCON consortium (European PhD in Science for Conservation) to offer 16 three-year EC Marie-Curie fellowships to young scientists holding a masters degree in one of the natural sciences, physical and/or applied scientific disciplines and wishing to specialise in the field of conservation science. A similar initiative within the UK could be timely.

14. The scope and potential of conservation science relates directly to the degree of activity in the relevant field. For instance, the highly active fine art conservation field is matched by high levels of conservation science; whereas the activity in scientific research in archaeological conservation has declined in parallel with an alarming decline in dedicated archaeological conservation posts in recent years; and the extent of research related to conservation of industrial and transport heritage is proportionately minimal.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

15. Our record has been good, but our pre-eminence is being eroded by countries which give higher priorities to heritage conservation, eg Japan, the Netherlands, Italy, Canada and the USA.

Is there a satisfactory process to develop practical applications of conservation research for the market?

16. There is no recognised process specific to conservation research; but some such breakthroughs have been made on the basis of personal initiative.

17. There are several active UK businesses supplying materials and equipment to conservators and collection managers. A few such firms are alert to research possibilities and maintain good collaboration with conservators and scientists.

18. The relatively small purchasing power of the market means that larger companies are unlikely to invest.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

19. The scope is immense, the potential largely untapped; energies need to be focused on this. The pressures on conservation and of conservation science resources have mitigated against this. The scientific and technological stories that can be told about objects are legion; there is enormous potential to enhance the quality of public engagement by this means. Every major conservation department should have staff and funding dedicated to pushing this boundary. Television production companies should be enlisted.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation? Is there scope for improving the use that UK galleries, museums and others make of such technology? What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

20. The use of interactive television in the Conservation Centre, Liverpool, has blazed a trail. Websites of heritage bodies are beginning, very tentatively, to include conservation and even conservation science in their presentations. The recent introduction of PDAs (for instance at Tate Modern) points to an exciting opportunity: to present to the visitor at the time of their visit, during their tour or immediately before or afterwards, the opportunity to explore the conservation and technological stories surrounding the objects and artworks in front of them, and to multiple levels of understanding.

21. Looking forward, it should be possible to run live video-links from studios and laboratories to websites; there could be a website devoted to bringing the latest discoveries to public view. Visitors should be able to place themselves in the shoes of researchers, to simulate analyses and conservation processes, to be taken

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through technological quizzes, etc. All this again requires dedicated staffing and funding within or attached to conservation departments.

22. This work would probably not fall within the remit of AHRC, and another funding source should be identified.

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APPENDIX B

Examples of conservation science and conservation research in action

- The Lindisfarne Gospels—raman microscopy enabled the pigments used in the Gospels to be identified, providing valuable and otherwise unobtainable information about trade in pigments.
- Chiswick House—The stonework of the gates of was secured by iron clamps which were corroding and damaging the stone. Following scientific study a galvanic corrosion prevention system, using sacrificial anodes, was installed.
- The Mary Rose—conservation of the timbers has been informed by an intensive scientific research programme into the decay of waterlogged timbers and the identification of optimum treatment regimes.
- The Tate—research into anoxic framing may lead to ways of displaying works of art on paper which are otherwise too fragile to be shown.
- Death-watch beetle—recent research suggests that most chemical treatments are ineffective in historic buildings and that natural predation may be a better solution.
- A new technique for recoding microscopically the accumulation of dust allows improved regimes for the display to the public of delicate artefacts in an historic house.
- Analysis of the components of a wall painting reveals the material of which it was made; some of the materials, applied in the early 20th Century, are the cause of on-going damage. Some of the original components were fugitive.
- A painting is darkened, its colours disappearing and the image almost invisible. Analysis of minute cross-sections and a multitude of analytical techniques enables an understanding of its original appearance and the causes of its degradation, some of it the varnish, some of it mistreatment in the past, some of it inherent. This study enables an informed choice on how to proceed: in this case to “clean” the surface using carefully formulated gels under controlled conditions.
- Microscopic analysis, using modern engineering technologies, of the minute movements of tapestry fibres reveals their weakness and anticipates the need to intervene.
- A delicate watercolour is both fading and crumbling, so it can neither be displayed nor handled safely. Analysis shows its acidic composition, caused by components in the original paper, information which dictates how it should be buffered to neutral conditions and mounted on acid free card and displayed in controlled lighting.
- Research has shown the damaging effects of agri-chemicals on some buried archaeological metalwork.

APPENDIX C

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NOTES

- The importance of conservation science is recognised by the Anna Plowden Award for Excellence and Innovation, one of the suite of Conservation Awards 2005 (www.consawards.ukic.org.uk)
- Cultural heritage has both a material and immaterial component. Our comments focus mostly on the material heritage, which however often carries meanings of the intangible heritage.
- Digital material is becoming one of the most important aspects of our cultural heritage. We refer you to the Digital Preservation Coalition for views on this.
- For more information about Icon, the Institute of Conservation, see www.instituteofconservation.org.uk
- Professional accreditation: Competence to practice is recognised by the professional body's accreditation scheme, the Professional Accreditation of Conservator-Restorers, PACR, introduced some five year ago. A significant proportion of those practicing are now accredited. Conservation scientists have tended in the past to rely on their scientific credentials and their scientific professional bodies; but a growing number of them are looking additionally for a dedicated accreditation route (ACR) within conservation. (see www.pacr.org.uk)
- The Conservation Register is a database of conservation businesses: www.conservationregister.com

Memorandum by the Institute of Conservation Science

This is a corporate submission which includes contributions from the Institute for Conservation Science (ICS) committee. It was posted on the ICS web site and also reflects the views of members who responded to the draft.

1. KEY SUGGESTIONS AND RECOMMENDATIONS

- Carry out and publish a national risk assessment for the UK cultural heritage, in order to determine research priorities.
- Make available analogue academic status for national museums, galleries, libraries and archives within EPSRC, as well as within AHRC.
- Ring-fence conservation science funding within a research council budget, since the subject is highly inter-disciplinary. AHRC or EPSRC would be appropriate.
- Consider the eligibility of conservation science journals for citation counting, in advance of RAE2008, the next research assessment exercise.
- Create a fixed term, five-year senior appointment within DCMS (as recommended in *The Science Review* (2005), or within a research council, to initiate, co-ordinate and evaluate the above tasks.

2. WHAT IS CONSERVATION SCIENCE

2.1 Conservation scientists carry out research to further the conservation, preservation and understanding of the world's cultural heritage. They are also conservation professionals with an understanding of conservation ethics and an appreciation of the visual memory, manual dexterity and aesthetic judgement of their conservation and curatorial colleagues. They act as mediator and interpreter between eminent authorities who include academics, historians and museum curators. They take an active part in an international community.

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2.2 The term “conservation science” is a relatively new one, which came into use in the 1980s. It is now widely accepted within the cultural heritage sector. It encompasses archaeometry. “Conservation science” is also sometimes used to describe work in the nature and environmental conservation field. “Cultural heritage science” might be a more appropriate term for the subject of this document.

2.3 Conservation scientists apply published materials research, independently developed analytical techniques, developments in sensors, detectors and imaging techniques, studies in environmental pollutants, knowledge of historical manufacturing and production processes, and the latest developments in polymer science, among others. Their knowledge has to be extensive, inter-disciplinary and multi-faceted. The science that underpins a number of past and even present conservation treatments is not fully understood. Conservation scientists investigate, improve and critique conservation processes. They develop and adapt existing analytical and examination methods to aged, fragile and unique artworks and buildings. They may have to work with tiny samples, sometimes on a sub-milligram level, and often work from limited physical evidence, much as forensic scientists do. Increasingly they develop marketable hand-held equipment and dosimeters for use by non-scientists in the cultural heritage sector.

2.4 Today’s research by conservation scientists evolves into tomorrow’s conservation practice. Well-evaluated conservation treatments are carried out routinely by conservators. Preventive conservation—the science of the display and storage environment—is still a major research area, but today it is also carried out by conservators, in a process called “housekeeping” by heritage bodies.

2.5 The best resource for conservation scientists is world-wide scientific literature, so in one sense this profession applies and develops existing research. Yet conservation scientists must carry out primary research where knowledge gaps exist on the properties and identification of materials as they age. They sometimes discover new compounds in consequence. The field includes both pure and applied research.

2.6 The goal of conservation science is the preservation of artefacts and materials far beyond their natural lifetime. To achieve this, an understanding of deterioration processes and the long-term effects of environmental conditions are vital. The most successful applications of conservation science are inherently difficult to appreciate—even to notice—since they lead to excellent preservation of the cultural heritage, to fewer cycles of conservation treatment, and to effective use of resources. They prevent irreparable loss.

2.7 Conservators seek to understand the long-term as well as short-term consequences of the treatments they carry out on individual, unique objects, in order to ensure the survival of the cultural heritage. However, artefacts are not only displayed, or stored for future display. They will be re-examined and re-interpreted in the distant future. It is necessary to know whether conservation treatment will modify chemical or physical properties of the artefact. Conservation scientists therefore characterise materials as well as analysing them and elucidating their deterioration processes. This involves the recognition of key physical properties, as well as their measurement on model materials, then small samples from artefacts.

2.8 Most artefacts and artworks are the products of little-known, ill-documented technologies and past industries, which are researched by archaeometrists. This work has had an enormous output in recent decades, and can be applied to the identification of fakes. Even in the field of modern materials, which are increasingly found in museum and library collections, industrial research is rightly more concerned with product improvement than with product preservation for the extreme long term. Conservation science research often commences at the point where the original artist or manufacturer stopped researching, modifying and improving the product. Only conservation scientists will ever carry out such research.

2.9 The range of materials which conservation scientists study could not be wider. It includes both the immovable heritage, comprising buildings and sites, and the moveable heritage. The latter consists of all the materials types found in museums, galleries, libraries and archives, and historic houses, and all industrial products of today, which will be in the museums of the future. This includes both natural and man-made materials, and ancient technologies as well as current ones.

2.10 Conservation scientists have an initial training in one of the sciences, almost exclusively a physical science. Physics was a common background in the past, chemistry is an increasingly prevalent background today, and smaller numbers have studied materials science, colour science, mechanical engineering or geology. Rather few have ever come into the profession from the biological sciences, but this is increasing slowly. It can be estimated that almost 50 per cent of working conservation scientists in the UK first studied chemistry, over 40 per cent physics, with the other sciences accounting for the remaining 10 per cent.

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2.11 Most conservation scientists recruited today are either in possession of a doctorate in the physical sciences, or would expect to obtain one during their initial contract or position. There are vanishingly few masters levels in conservation science world-wide, most running parallel with a conservation masters-level program, and not a great number of conservation programmes either, since the profession is a small one in comparison to many other employment sectors. In many European countries, conservation is not a recognised profession, and it is not therefore possible to obtain a higher degree in the subject. This is in contrast to the UK, which has offered a significant number of doctoral positions within museums over the past 10–15 years. A doctoral course in conservation science, by distance learning, will commence during 2006, based at the University of Bologna, Italy.

2.12 Conservation scientists are to be found in almost all the national museums and galleries in the UK, and in some heritage bodies such as English Heritage and Historic Royal Palaces, but only recently in national libraries and archives. Their numbers increased in the 1970s and 1980s, but are reducing now. About 50 per cent of ICS members are employed in these areas. There are none in local authority, university or privately-run museums and heritage attractions. They teach on all the UK conservation programmes, though some are mainly employed as academic staff within university science departments. Many academics worldwide have a strong interest in research in the cultural heritage sector. Few have much experience or understanding of conservation philosophy and ethics, or of the complexities of pre-industrial and/or naturally-aged materials. Those academics involved in teaching conservation (the Institute of Archaeology and the Courtauld Institute are good examples), or with a long association with a national museum, can also be styled conservation scientists—indeed some have moved between the two employers in the past.

2.13 Conservation science is a profession where the experience and expertise of one researcher can make an impact on the whole field for decades. Each conservation scientist builds up expertise in a different area. Thus there is an inherent danger that all research priorities cannot be addressed simultaneously. There is a great deal of informal sharing of information and facilities, not only within the UK, but increasingly among international groups of collaborators. Recent years have seen successful data-sharing world-wide for techniques such as FTIR, and proposals for similar sharing of mass spectrometry and Raman data. This aspect will increase in importance in the future.

2.14 Of all heritage professionals, conservation scientists have had the greatest commitment to publishing and disseminating the results of their research to a wide audience. Their published output is at least comparable to that of museum curators. Many papers in the conservation literature are written by conservation scientists, and most conservation scientists publish far more regularly than do conservators. Today, the number of conservation scientists who are journal and book editors is also high, disproportionately so in relation to their overall number, and in the past it was even higher. Conservation scientists do publish in the scientific literature too, but generally at the beginning of their careers. It has to be said that the mainstream scientific literature is rarely consulted by conservators and never by other museum professionals. Purely scientific papers would be perceived by most cultural heritage professionals as entirely lacking in context, and therefore of limited use. In the pure sciences, much more emphasis is given to the development of a new, unique method, or to its first application to cultural heritage material, than to the new light it could shed on large groups of artefacts, and by extension on our understanding of culture, history and aesthetics.

2.15 All scientists become skilled in report-writing during their training and professional life, and by a logical extension, many are more skilled in writing successful applications for funding than other heritage professionals. Thus, they have occasion to produce project reports aimed at a wide target audience: grant-awarding bodies, trustees, and the general public, as well as the conservation profession. In consequence, their skills in “translating” scientific concepts into other fields, and in explaining the relevance of their work, become highly honed. Increasingly conservation scientists make major contributions to initiatives on the public understanding of cultural heritage and the public understanding of science.

2.16 Conservation scientists often contribute substantially, even disproportionately, to the development of policy and protocols within the public institution where they work, for the reasons outlined in 2.14 and 2.15. They contribute both to the scientific literature, and to the cultural heritage literature. Their work informs decision-making on public access, public understanding, resource commitment and management of cultural heritage sites and collections. Increasing public access implies increasing exploitation of public collections and the publicly-owned built heritage—conservation science skills are needed more than ever before.

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3. RESPONSE TO THE CALL FOR EVIDENCE

3.1 *National and international co-ordination of research*

Informal networking and an open attitude to knowledge-sharing have served a small profession very well. There are increasing numbers of conferences both in the UK and world-wide, most of which are now published as peer reviewed pre- or post-prints. There are good opportunities for discussion in small groups, but there is no overall co-ordination of research priorities. In effect, there is none because there is no co-ordinating body with this remit. However, research within museums is prioritised according to the needs of national collections, and since the UK has an unparalleled quality, range and scale of collections, never dispersed or lost through war, this is not a great drawback. The most successful university research for the cultural heritage sector is influenced by these collections-based priorities.

3.2 *Is conservation science research adequately funded?*

Given the scope of the sector, the answer will always be “no” from practitioners. It is of concern that many areas of fundamental research once undertaken by public institutions from core funding are now continued only with external funding. Fund-raising efforts dilute the output of conservation scientists, who are becoming research managers rather than full-time researchers, throughout the UK. Furthermore, funding from the research councils has almost certainly declined in absolute terms, since conservation science currently has to compete with other applications couched in terms of cutting-edge development rather than cutting-edge applications. UK conservation scientists have competed very successfully for EU funding, and would be concerned if this source were not to continue at its present level, in the 7th Framework Programme. It would be interesting to define and evaluate a ‘cultural heritage research GDP’ for G8 countries: the ratio of funds devoted to conservation science research, to total funds available to national heritage institutions. Our guess is that this would be far lower than the country’s actual ratio of research expenditure to GDP (itself middle to low in the international league), but might follow country-to-country GDP trends. Recent UK developments such as the acquisition of academic analogue status by a number of museums and galleries are very welcome. Ring-fencing of conservation science funding within one of the research council’s budget would be even more welcome: the newest research council, for the Arts and Humanities, is a natural candidate, since conservation science is a highly inter-disciplinary subject. The EPSRC is another candidate; analogue academic status for museums etc with EPSRC is desirable. Reduced funding has certainly reduced to zero the opportunity for UK conservation scientists to carry out blue skies research, still active in the US, the Netherlands and Italy.

3.3 *Is the funding directed at the right areas?*

There has been no data-gathering to determine this. There is no national risk assessment for the UK heritage, and therefore no list of research priorities. There is a great need for such an exercise. Research priorities and funding bids are now being co-ordinated by national library and archives. Heritage bodies such as English Heritage have always had a strong co-ordination function. Museums and galleries are less co-ordinated. It is fortunate that the heritage profession has now matured to an extent that there are many staff in post with 20–30 years experience, who can provide that overview to individual institutions.

3.4 *Does the UK possess the appropriate capacity and skills base?*

International reputation, the conservation literature, and the increasing number of overseas students who seek to study and research conservation in the UK, prove that it does. Arguably, the UK has more conservation scientists per million of population than most other countries in Europe, and probably more than the US—which reflects the importance of its collections. Yet the skills base has expanded only slowly.

3.5 *Career structure and employment patterns*

There is serious loss to the profession of both newly-qualified doctoral researchers, and then of younger conservation scientists after five or 10 years in post, due to low salaries (typically close to or below the national average, whereas salaries for experienced UK scientists and engineers have always exceeded the national average by a factor of 1.5 to 2), and a lack of career structure. They mostly cite the last point as contributing to their career change. The contract culture has further eroded prospects for developing individual careers in conservation science. The retiring generation of heads of conservation in national museums was largely trained as scientists, and most worked in their institution as a conservation scientist first. Improved training and status for conservators has resulted in conservation departments now being headed by a conservator, with a career manager having higher authority, which has further eroded career structure for scientists. The retirement crisis threatening physics and other hard sciences—the loss of up

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to 50 per cent of practitioners through retirement in the next 5–10 years—is not a concern for conservation science.

3.6 *UK rating for cutting-edge science and technology? Peer review?*

Performance indicators are hard to define (cf 3.1). Most conservation science papers are now published in fully peer-reviewed journals and conference proceedings. We deplore the fact that very few of these are included in citation counts, *Studies in Conservation* being almost the only exception. This is a disincentive to university research partners to publish where their work will find the largest audience: the conservation profession. Journals eligible for the citation counts should be re-considered before RAE2008, the next research assessment exercise for British universities. All major research proposals and funding applications are peer reviewed, providing a level of assessment at the proposal stage that is not attained by other areas of museum-based research. Research proposals to independent trusts are in general more detailed and more specific as to deliverables than typical applications to UK research councils. The quality of research is judged on its scientific competence and also in a wider competitive field on its application and relevance to cultural heritage. The UK's international reputation in this area has always been high, as was noted in 3.4. Practitioners perceive that the UK output in this area is declining due to cutbacks in funding.

3.7 *Is the process for spin-out and commercialisation satisfactory?*

Given that there has been no overall co-ordination, and given the small size of the sector, there have been a surprising number of commercial products brought to the market in the past 10 years. This reflects the maturity of the profession. A degree of financial support and mentoring in the form of business skills would accelerate this spontaneous trend. The Public Sector Research Exploitation Fund, previously set up to meet this need, has now announced recipients of the third round of funding for three-year initiatives. This is one area where funding may be seen as satisfactory.

3.8 *Could conservation science improve public engagement with cultural heritage, and public understanding of science?*

It has already done so, very successfully. The annual Conservation Awards and awards from the Jerwood Foundation offer examples. The only failure is a public relations one: the profession of conservation science is rarely identified explicitly in the process. Press releases from all heritage organisations tend to refer to “experts”, conservators or archaeologists instead. There is certainly scope for more work in this area, again due to the maturity of the profession—but with static or contracting numbers of conservation scientists in employment, it will be at the expense of new research to generate further spin-outs in public engagement. Conservation scientists are well placed to identify new initiatives and new technologies applied to display and interpretation and to utilise them: they are by definition the most IT-literate group within heritage organisations.

3.9 *How can IT improve public engagement with cultural heritage?*

All recent examples have involved collaboration with universities, and have generally involved post-graduate researchers or contract posts, rather than staff in permanent employment. Museums etc have concentrated first on developing web sites with basic information about huge collections, and most now have specialist staff such as web editors. The time is ripe to promote in-depth studies of interesting artefacts on web sites and through interactive displays. This is an area without co-ordination, and without documentation or archiving for preservation of individual initiatives. A survey of resources, successes and failures would be welcome. Arguably, small museums and sites with few visitors benefit more from interactive displays, which are swamped by visitors in large national museums. The issue of handheld devices (PDAs) with high-resolution screens to visitors is a welcome step, easily adaptable to sharing the results of conservation science research.

3.10 *The best example of IT in promoting public engagement?*

Two examples in the UK are the Liverpool Conservation Centre, and *Turn the Page* at the British Library. The latter installation gives access to high-quality facsimiles of artefacts, and is possibly not unique. There is no central database of such initiatives, however, and it is difficult for both researchers and the public to discover their existence.

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Examination of Witnesses

Witnesses: MR ALASTAIR MCCAPRA, Chief Executive, DR DAVID LEIGH, Senior Policy Adviser, Institute for Conservation and DR JOYCE TOWNSEND, Chair, Institute for Conservation Science, examined.

Q388 Chairman: Good morning and welcome to the second session. I think the three of you have been sitting through the first session. Can I say that it is very nice to have you here. Would you like to introduce yourselves and if I may again I would like to go straight into questions because time is a bit of a constraint on us but if there is anything that you are burning to say in terms of an opening statement then please feel free to do so. Dr Townsend, would you like to start by introducing yourself, please?

Dr Townsend: I am Joyce Townsend. I am the Chair of the Institute of Conservation Science. I did want to say a few words about it. The ICS was founded in 2000 with the aim of promoting the understanding of conservation science in the UK and presenting its needs and achievements to others. We are based in the UK but we aim to represent the views of full-time conservation scientists world-wide because this is an international and collaborated subject. Members work in museums, galleries, et cetera, universities and in a few cases on a freelance basis, generally very closely working with conservators and other heritage professionals. The members of ICS will vote in June of this year on a proposal to merge with Icon, the Institute of Conservation. In retrospect the subject could have been called Cultural Heritage Science and it might better describe it, but it includes the application of scientific methods to the identification and characterisation of natural and man-made materials during long-term ageing and the development and evaluation of conservation processes based on such studies and the development of preventive conservation methods and protocols through a research into deterioration. Since collections are continually expanding to include modern materials the range of topics for study is always growing. In common with the other ICS committee members I work full time elsewhere in a national museum, in my case at the Tate.

Q389 Chairman: Thank you very much. Dr Leigh?

Dr Leigh: We also have a statement we would like to make, but shall I just introduce myself for the moment. I work for Icon, the Institute of Conservation; I am the Senior Policy Adviser. Incidentally I am also secretary general of the International Institute for Conservation which, among other things, publishes the peer review journal, *Studies in Conservation*.

Mr McCapra: I am Alastair McCapra; I am Chief Executive of Icon, the Institute of Conservation and I would also like to make an opening statement briefly if I may.

Q390 Chairman: Which one of you is going to make the statement for Icon?

Mr McCapra: I will go ahead if I may. Heritage is a non-renewable resource and conservation science is essential to ensuring that it is a resource that we continue to value and understand. We believe the current climate for conservation science is increasingly difficult and there are few immediate signs other than this inquiry to suggest any early improvement. We are fortunate to have in David Lammy a minister who cares passionately about heritage and who understands the importance of conservation in its widest sense. However, we do not believe the DCMS has regarded conservation science as a priority and see no imminent signs of any change to this. We have heard this morning from large national museums. DCMS also, of course, funds English Heritage which, in the past, has been a major leader in conservation science although we have some serious reservations about the future of that. The other funding stream goes to MLA. MLA has a 14 page operational plan for the year 2005–06. In this plan conservation is mentioned twice, once in the context of the conservation awards which the Institute of Conservation runs and which MLA supports financially. The only other mention of conservation is a key output in the form of bursaries to develop an internship scheme for conservation trainees. This is actually a scheme run by my organisation, funded by the Heritage Lottery Fund, to which the MLA has only given its encouragement. The plan makes no mention whatever of science or conservation research. The new regional structure for MLA has created a national network of relatively small organisations with broad and challenging remits. None of these has conservation science as a priority and none is funded adequately to take any kind of decisive lead in science and heritage. As we believe this inquiry has highlighted, conservation science currently suffers from a lack of strategic direction, a lack of effective career progression and a lack of sustainable sources of funding. As a small, independent membership body we do not command the resources necessary to address all of these problems. However, we are currently in discussion with the Institute of Conservation Science about a merger of our two organisations. This merger will be an important step in integrating conservation science with the wider conservation community. If funding is available we would be delighted to host a national conservation science coordinator to lead a more coordinated approach, help shape the national research strategy, broker funding from different

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sources and help disseminate the fruits of research to conservators in practice.

Q391 Chairman: Thank you. The first question I would like to put to you is that the written evidence from Icon refers to the inadequate collaboration between conservation scientists and conservators and other end users of research. What are the reasons for this and what can be done to improve the level of collaboration?

Mr McCapra: I think there are a number of issues here. Firstly, until the conservation bodies merged last year into the new Institute, conservators were relatively fractured as a profession and they were largely fractured along the lines of specialisms so there was one body for photographic materials, one body for paper and so forth, so it was difficult and science was not disseminating out to a single unified community. Secondly, it is still the case that conservation science has its own organisation for good historical reasons, but that is something that we hope we will be able to address in the coming year. There was no clear means for the conservation community to communicate its needs to the research community. A coordinator based in the Institute—or indeed if we do not get a coordinator that is something we would want to take on ourselves—would open up that channel of communication to make sure that there is a line of communication from practising conservators to the research community. Some research is, of course, very collections-based and the practical implications of it are usually readily clear to the people who are in charge of that collection. The more downstream consequences may take longer to disseminate out into the wider conservation community. I think there is a need for some kind of translation from peer review to academic papers through grey literature to slightly more accessible things which practising conservators will find easier to read and get to grips with. Lastly—I think this was referred to this morning—the pressures on researchers are to publish in journals with the highest citation rates and those are not usually conservation science journals. As David Saunders mentioned there is this constant need to address two separate audiences, one which is the scientific community and the other which is the conservation community. Those are the major issues, I think.

Q392 Chairman: Dr Townsend, is there anything you would like to add to that?

Dr Townsend: Yes, I would agree. Also there is no public institution for conservation science; there is no obvious point of approach for conservators working in the private sector. What they can do is seek collaboration with one institution but it is a

collaboration not a service and they must face genuine difficulties of access.

Q393 Chairman: From the answers you have given, to some extent what you are saying is that Icon can take a lead. This morning we were talking about the relative role of DCMS and the research councils and the Arts and Humanities Research Council has set itself up as “the champion” for conservation science within this area. Do you feel that this would be satisfactory in terms of the AHRC perhaps taking a lead here? Is this an organisation that could lead in terms of identifying the gaps in conservation science and, generally speaking, why has there been a failure of leadership in this area?

Dr Leigh: Firstly I think the recent creation of AHRC and its engagement with the conservation science community is really very much to be welcomed and I do not think that one should judge things too soon. Their wish to take a lead in relation to the other bodies has been clearly expressed and that is to be welcomed and I would give them, at this stage, the benefit of the doubt that they can actually lead and provide the collaboration which they talk of and which they do seem to be very well aware of the need for. I think your question about lack of leadership does partly come back to the point of coordination and we have made the suggestion and I think now, having heard various sessions, feel even more strongly that a coordinator would be an extremely good appointment, funded perhaps by the research councils jointly and over a five year period. His or her job would be to survey the needs of conservation, to identify the gaps, to search out the relevant collaborators and the facilities, the scientists and the conservators; to improve communication amongst them all possibly establishing or supporting a conservation research network such as we have heard posited today; to propose projects, to nurture applications, to actually train applicants in creating and then finessing applications in order to produce grant-worthy applications; to scan the European and other funding sources, to liaise with the council research staff and selection boards, to maintain liaison with the various parties during their research projects; and, last but not least, to ensure publication and proper dissemination and generally to act as advocates for conservation science. I think those are the sorts of roles that we have been missing and I think that partly answers your question.

Q394 Chairman: Yes it does, thank you. There is a draft job specification there already, is there not?

Dr Leigh: Indeed.

Chairman: Lord Broers?

Q395 Lord Broers: I think the situation is even broader which leads me to my question which is that much conservation science activity is concentrated in the small number of national museums and galleries rather than the thousands of regional museums. In addition, most conservators work independently; are there problems being encountered in disseminating the results of conservation science research across the profession?

Mr McCapra: First of all I think that the problem about the thousands of regional museums comes back to the lack of any real steer on this question through MLA; they are not funded to do it, it is not in their performance indicators. Indeed, many of them do not have specialist conservation staff so in that sense there is nobody to disseminate to. Even if we make information more available there has to be a conservator at the other end to pick it up and do something with it. In some cases there are general collections care staff or curatorial staff who will be able to make something of it, but it is not safe to assume that there are conservators in all of these small regional museums who are somehow just not picking up on this for some communication reason. In the past there were larger conservation departments certainly inside national museums and therefore it was much easier to get the fruits of research out to the wider conservation community and the trend over the last 20 years towards outsourcing and having more conservators working in private practice has slowed that dissemination down. It does get out; I would not want to overstate this and leave you with the impression that there are professional conservators out there working in blind ignorance of current science. But it is a slower and patchier process of dissemination than it was in the past.

Dr Leigh: If I may add to that, there really is no substitute for expertise on the ground. It is fine to have strategic agencies about but what is really needed are staff who know to look at the collection, to actually know their collections, staff who can identify when storage and display conditions need to be changed, and staff who can themselves carry out work on collections or know who the very best person is to carry out that work. I am referring here to the disappearance of the Area Museum Councils, many of which had conservation facilities of their own. These have all disappeared and have not been replaced with similar facilities. These foci would have provided the people who would also have identified the research needs and energised the research process and indeed would have attended the conferences that we heard about earlier on today. I should be very surprised if there were significant numbers of conservation staff coming from regional agencies—who should be there but just are not—to pursue that dissemination that we

were talking about. I think there is a gap there. We now have a situation where there are some 2,000 non-national accredited museums, to say nothing of libraries and archives, with really little more than a few handfuls of professional conservation staff among them or even advising them.

Q396 Lord Broers: Can I ask you how you are funded and whether the national museums and institutions are members of your Institute? Would you then charge them a corporate rate?

Mr McCapra: We are funded very largely by membership subscriptions.

Q397 Lord Broers: Individuals?

Mr McCapra: Predominantly individuals. We do have organisational membership and many conservation departments in museums, libraries, archives and galleries do have organisational membership which costs £150 a year.

Q398 Lord Broers: What are your views about the level of interest and engagement in the UK in conservation science research and what is hindering the wider body of conservators from participating in research and utilising new methodologies, techniques and results?

Dr Leigh: There is no lack of will on the part of conservators. Perhaps this is the moment to point out that many conservators—an increasing number of conservators in this country—are now accredited. We have, I think it is fair to say, a world leading success in having established an accreditation scheme for conservators. Part of the process of accreditation requires them to demonstrate keeping up with latest developments and scientific progress. Indeed to maintain their accreditation—their CPD—requires them to demonstrate that they are keeping in touch. To some extent we have blazed a trail on that. There is no lack of will; there is no lack of support. I think the reality is that given the pressures on conservation staff in museums, galleries, libraries and archives they are tending constantly to have to respond to the daily pressures of exhibitions and all the other pressures that are now on them and really do not have the time to dedicate to pursuing research themselves, nor do most of them have the facilities. If they had the chance they would be searching out partners but that is not something that on the whole they can do. So there is no lack of will, it is just lack of time and resources.

Mr McCapra: So far as independent conservators are concerned, as I mentioned in recent years there has been an increasing tendency towards outsourcing conservation work from institutions and as a result a growing proportion—certainly the majority of our members—are in private practice

and most people in private practice are not really well set up to participate in research. It is not really a priority for them; they are trying to earn a living and they certainly do not have the kind of equipment or the general environment that would encourage them towards that. Some do, but it is not an easy or commonplace thing.

Chairman: To a degree that brings us back to the issue that Neil Macgregor raised with us in the previous session which is the lack of resources generally going into museums and galleries in the UK. Lord Sutherland?

Q399 Lord Sutherland of Houndwood: The national museums and national bodies have not been very encouraging about the idea of a national conservation centre but it keeps bobbing up to the surface again as a possibility and I wondered what your views on that were? Is there a need for it? Should we think about this again?

Dr Leigh: I think it is fair to say that in our evidence we also say there is that possibility and more or less dismissed it. I think other witnesses have taken a similar line. There seems to be a consensus that such a physical centre would probably not be a worthwhile enterprise in current circumstances. We support the idea of a virtual network. That is not a difficult thing to get established but a virtual network on its own will not necessarily provide the impetus and the coordination which is really required. We believe the design and establishment of such a network and giving it a purpose could fall to our proposed coordinator.

Q400 Lord Sutherland of Houndwood: Are there possible models? Italy, for example, has a regional network of some kind. You are clearly not supporting the notion of a physical centre but it would take a lot of work to put together some kind of network. Would the effort be worthwhile?

Mr McCapra: Parts of it are already there. Many people who have given you evidence are either collaborating informally or are well placed to collaborate more closely so in a sense what we are looking for is a centre and a stronger sense of direction to pull those things together. It certainly would not be starting from scratch. In fact one of our reservations about the establishment of a centre would be that we would waste a lot of time re-inventing wheels which in fact already exist.

Q401 Lord Sutherland of Houndwood: How many members do you have in your organisations, either individual or corporate?

Mr McCapra: We have 3,000 members of whom about 400 are organisations.

Dr Townsend: We have about 70 or 80 members, a very small proportion of these are organisations because we have not pushed that angle.

Q402 Chairman: Dr Townsend, is there anything you would like to add to the answers that have been given to that question?

Dr Townsend: The ICS would also support the idea of a network, a virtual centre rather than a national centre. The idea of material specific centres along the lines of the textile research carried out at the University of Southampton also seems a very good model to extend to other areas. Everything that has been achieved in conservation science has been done by incremental steps; there has never been a large injection of funding to enable large steps to be taken so it is a way we are used to working. The problem is that it takes a long time to get very far with small steps.

Q403 Lord Chorley: The ICS says in a bullet point right at the beginning of their evidence: "Carry out and publish a national risk assessment for the UK cultural heritage, in order to determine research priorities". There does not seem to be any one body currently prepared to take on responsibility for setting this strategy for conservation science. Is there a need for such a strategy and, if so, who should provide the leadership? Do we need an audit first and, having got an audit do we need a strategy; thirdly, who should do it?

Dr Townsend: I suspect that we do need an audit. It has been very difficult to answer questions as to how much need is unmet. The profession does not normally look at that area, partly because its members are placed in single institutions which have institutional priorities. I think there is a real danger that some aspects may not be covered and increasingly institutions seek funding for research in areas that are likely to succeed rather than looking broadly at overall need.

Mr McCapra: We would certainly support the idea of needs based conservation research. I have to say that I am personally slightly sceptical of an overarching national audit because it would probably take an extraordinarily long time to do and an enormous amount of money and by the time you had finished the picture will have changed. There have been piecemeal or smaller scale mini-audits. For example, the National Preservation Office which works in the libraries and archives field published a report in October last year which showed that 1.6 million books and other items were in the highest need, by their definition, of preservation work. This was not a national figure; this was only for the 41 collections included in their survey. If you extrapolate up from that, there are tens of millions of items requiring some sort of

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attention. Sixty-six per cent of all archive and library material included in the survey was housed in environmental conditions which did not meet existing standards. The point has been made today that museum collections continue to expand exponentially. There are constantly new materials. People often think of conservation as being about very old artefacts but actually some of the big scientific challenges are for 20th century materials—plastics and other things—so in a sense the needs horizon is constantly expanding and I think if we can get the major research players round one table, having the kind of coordinated conversations we have talked about, it should be possible to come up with the kind of quick and dirty—if I can put it that way—needs based approach which would perhaps avoid having to spend a great deal of time, money and effort on a large audit.

Q404 Lord Chorley: What is your view on what has been described as the declared cascade of responsibility for the conservation of the moveable heritage from DCMS to the MLA or to MDA?

Mr McCapra: I do not think there really is one. I think in the evidence which was presented to this Committee the spokespeople for DCMS made it clear that they took the opposite view, they expected someone to tell them if there was a problem, otherwise they assumed everything was fine so nothing is cascading down. If you look at, for example, the funding settlement from DCMS to MLA there is nothing in that about conservation science. In that settlement DCMS explicitly tells MLA what its priorities are to be and how much money is attached to each of those priorities and what the performance indicators are and what the timetable is. There is nothing in there about conservation science. Our gripe is that nothing is cascading down from the top. That is not to suggest that we want DCMS to take a heavy-handed role and start being directive and telling organisations like the British Museum or Tate or the National Archives exactly what to do, but I think we feel they are simply not setting the general scene effectively from the top.

Q405 Lord Chorley: There is an implication coming through all this that because conservation is at the heart of everything that museums and galleries do it does not need to be identified as a distinct priority. I think to some extent you have already answered that, but do you think it is a fair summary and is there a risk that conservation is not being seen as an important activity in its own right. In some ways you have already touched on this quite a lot but you may want to add to it.

Mr McCapra: I think it is more than a risk; I think it is a reality.

Q406 Baroness Finlay of Llandaff: In the written evidence from the Institute of Conservation Science you refer to a lack of a list of research priorities. If such a list is needed who should be charged with preparing it?

Dr Townsend: It could fall to the coordinator, the coordinating role we have discussed, perhaps funded through the research councils. I think there is a need for it to emanate not from a single institution but from a new role and I think that conservation and even more conservation science has suffered from there being no point of focus in many of the recent initiatives towards public assess. Conservation science, as a term, is never mentioned; conservation might be mentioned; collections care is frequently mentioned. There is a need to bring more focus onto the science and to acknowledge that it has a role to play.

Q407 Baroness Finlay of Llandaff: Given that there is a wide range of views from diverse institutions and users of such research, how would all of their views be taken on board in formulating such a list of priorities?

Dr Townsend: It would have to be through consultation. Except for this inquiry there has never been a point of focus for that, no obvious call for it to be done. There are many historical reasons why it has not happened and it needs some impetus in order to happen.

Q408 Baroness Finlay of Llandaff: Who do you think would use it if this list was compiled?

Dr Townsend: I would think the museums would see it as a way of establishing funding priorities for their own seeking of funds and in particular universities would look at it with a view to future partnerships. There will always be universities interested in coming into the area of cultural heritage; it is very difficult for them to see where to go.

Q409 Baroness Finlay of Llandaff: There has been a common concern expressed that there is weak evidence to back up the claims about gaps in research. I just wonder how you all saw your roles in gathering evidence to galvanise policy and public opinion that there really are gaps there that need to be addressed and need to be addressed fairly urgently.

Dr Leigh: Firstly to dignify what my colleague said about something quick and dirty, I think, we foresee broad themes, perhaps not so much a detailed list which you have to stick rigidly to, but a thematic assembly that would change as the years pass so that it could be a living thing which responded the changes and needs of the conservation community and indeed of the needs of the collections. What we do not want to have is a very fixed set of areas which

we cannot veer from, that acts as a straight-jacket, that might actually impede and work against creative and imaginative research. There are a lot of people there who are willing to contribute to this just as there have been people speaking to you; I think the will is there. On the latter part of your question about galvanising the public this is something which we feel quite strongly about. Here conservation science just has to be seen within the broader scope of heritage conservation and caring for the heritage. We know—and it has been discussed today—that the public does appreciate the fruits of conservation. They appreciate having access to their heritage and we know they actually love to see conservators at work. They recognise the need to preserve it for the future. There needs to be more emphasis I think in museums and libraries and galleries on conveying collections interest within the museum space on the web. There have been moves in this direction; there have been some wonderful isolated examples. Maybe a dedicated funding stream that said, “Here is some money to really use IT to promote the wonderful discoveries and revelations that conservation can bring about these collections and could excite the public in what conservation does and the stories it has to tell and reveal”, I think that could go a long way to helping. It would also require support, if only moral support, expressed from bodies such as the DCMS to support investment by the organisations you have heard from. For instance the DCMS, as we have heard, should not be taking a very detailed line but should give that support and ask for accountability and say to museums and the like, “What is the condition of your collections? How is it being maintained? What is the feedback you are giving to the public? What public interest is being generated in conservation research and all that it provides?”

Q410 Baroness Finlay of Llandaff: Listening to you you make me wonder you need to have a television series, almost an Esther Rantzen or a Robert Winston, to really promote this in the public mind.
Dr Leigh: You could trigger a flow of even greater enthusiasm there and that is certainly something we have in mind. In fact, as you may know, we operate the Conservation Awards which is having increasing profile over the years—we are now coming to the eleventh year—and every year we hope we can build onto that sufficient media interest that we do actually generate a series out of it.

Q411 Chairman: There really need be no competition for funding between access and conservation because the two really can go together very well.

Dr Leigh: Completely, yes. It is a matter not so much of the quantity of access which is what government tends to want to measure, but it is the quality of the access which conservation science can add to so very well.

Q412 Lord Broers: We have heard concerns expressed about the declining skills base in conservation science research, the poor career structure and the loss of budding conservation scientists disillusioned by the lack of career prospects. What actions do Icon and ICS consider are necessary to build capacity in conservation science research and to develop a viable career structure for conservation scientists? What do you consider your role to be in this activity?

Dr Townsend: That one is hard to answer except in terms of saying that increased funding would help. I think the career structure problem is real. There actually have been improvements over the past decade or 15 years when the institutions successfully obtained funds for PhD level work. The difficulty comes after that. The institutions do not see themselves as able to employ all of these people and there are very few other places where they could continue to work in this subject area. So both post-doctoral and career conservation science is a concern, particularly as a lot of those in post are due to retire within the next 10 years.

Dr Leigh: We do want to see a shift towards more permanent long term funding. We have heard about the problems of short term funding. It is wonderful to have and no doubt the research bodies will continue to provide that, but I think the established research centres do require encouragement to increase the number of longer term posts and it is sad to hear about things going in the opposite direction today.

Mr McCapra: There are two things specifically that we are trying to contribute towards a developing workforce. I mentioned earlier that we have a Heritage Lottery funded work based learning scheme and that will fund about 15 people to spend time learning conservation skills in the workplace. There are 16 this year; one of those 16 is a conservation science placement with English Heritage and there is a second one which is planned for next year and there may indeed be others afterwards so we are doing what we can at the bottom end of the system. Unless there is sustainable funding and posts for people to go to there is not a career there for them and that is something which is really largely out of our hands.

Q413 Lord Chorley: The Lottery Fund is a one-off funding is it not?

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Mr McCapra: Yes.

Q414 Lord Chorley: It may last for three, four, five years possibly; it is not on-going.

Mr McCapra: Exactly.

Q415 Lord Broers: We have heard of a European initiative funded by the Marie Curie Programme led by the University of Bologna that will be rolling out a PhD programme in conservation science but we note that no UK institution is participating in this initiative. Why not?

Mr McCapra: We are possibly not the right people to ask. As a professional body I am not sure that we would have been eligible and I do not think we existed at the time when it was all being put together. I do know that there are no collaborators from France or Germany either. About half the collaborating bodies are Italian with some Hungarians, Rumanians and a sprinkling of other people. I do know from what I have picked up more broadly that a lot of institutions feel they have to make a judgment between the potential benefits of getting involved in an EU funded programme and the complexities of dealing with it, and in this case I do not know whether UK institutions were approached or considered it but they may just have felt that for the sake of 16 fellowships spread across the entire EU that the burdens of involvement were not well justified.

Dr Leigh: Of course UK nationals are eligible to apply for these fellowships. We have advertised this programme to all our members through our e-mail alert system.

Dr Townsend: In that case it certainly came back to the problem of knowing who to approach and in fact the Institute of Conservation Science was founded shortly after that in an effort to create some body which could be identified as a voice for conservation science and we did attend the later meetings and the final project report for that training course in its initial stages. We were made aware that that group of organisers felt they could approach a single British institution or they could work with those they already knew and had collaborated with in mainland Europe.

Q416 Chairman: Can I finally pick up this issue of long term core funding and ask you how you would reconcile the need for collection based research within museums and galleries with the desirability of establishing long-term core funding for more general conservation science research.

Mr McCapra: I am not sure that they need to be reconciled because both are required. There is an important role for both of them and I think we would not want to see one privileged over another. I think it is important that they are not set off

against each other in any discussion about funding as both have an important role to play.

Dr Leigh: I would say much the same. Collections cannot be properly stored, interpreted, displayed and presented without conservation science and it is for the museums themselves to address this. However, coming back to an old sore, they will only do so if it is made a strategic requirement that they address the needs of their collections and this has, in many cases, to come from higher up.

Q417 Chairman: I think when we have spoken with the university scientists there has been something of a problem that faces them so far as they are concerned. They have told us that their research often consists of finding new applications for existing methodologies and techniques drawn from other fields so as better to understand the deterioration and change in cultural materials. What is the view of ICON and ICS on the question of the division between the pure research carried out in universities not tied to specific collection needs on the one hand and the applied research which is effectively collection bases?

Dr Leigh: I think we may have referred to this in our response. I think the distinction is, to a degree, artificial. It remains the fact that museums and the like hold collections and they face stewardship issues and presentational issues on a daily basis. University science departments on the whole do not have collections so that is a division that one cannot gainsay. Nevertheless there is still insufficient brokering between these parties and it comes back to a central co-ordinating role to help overcome those differences and clearly there is a gradation between pure research and its application and its use by the end users. The British Library and the National Archives have, to some extent in recent years, blazed a trail by bringing people together, identifying priority areas, notably with the help of United States foundation money and we would hope to see a greater sense of direction and dynamism generated for museums collections also.

Q418 Chairman: Finally, are you happy with the role of the research councils in supporting the development of a strong scientific base for cultural heritage conservation? How do you see this developing in relation to the pressure, to some extent, from research councils also for partnership and linkage with end users, for example linkage between university researchers and the National Trust developing? Where does Icon and the ICS sit in terms of some of these developments?

Dr Townsend: I think there is a very large role which the research councils could play, particularly the AHRC. The gradation from pure research over to applied research is also a gradation from the

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sciences to the humanities. It should be pointed out that many universities have very significant collections and although they carry out research and cultural heritage it is very rarely into their own collections so there is another sector which is being missed out and where more focus from the research councils, in particular the AHRC, might redress that gap.

Q419 Chairman: Is there anything you would like to add to this?

Mr McCapra: Only that I think the prospect of closer partnerships between the different research councils is one that we welcome, having for years

fallen between various stools. If we could actually get all the stools close together I think that would only be to our advantage.

Chairman: I think with that we should finish. It is just past one o'clock and I would like to thank all three of you very much indeed for coming. I think it has been a very useful session added onto the one we had earlier and we are most grateful to you for giving up your time and coming to answer our questions. Thank you very much indeed. Can I add also that should you wish to supplement any of your answers please do not hesitate to write to us and anything you do send in will be published alongside the transcript.

TUESDAY 23 MAY 2006

Present	Chorley, L Finlay of Llandaff, B Hilton of Eggardon, B Paul, L	Redesdale, L Sharp of Guildford, B (Chairman) Winston, L
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Examination of Witnesses

Witnesses: MR DAVID LAMMY, a Member of the House of Commons, Minister for Culture, and LORD SAINSBURY, a Member of the House, Minister for Science and Innovation, examined.

Q420 Chairman: Good morning, ministers. We are extremely grateful to you both for coming this morning. We have been having a very interesting inquiry. I would like also to welcome members of the public here and say that there is a note about the inquiry available, which also lists, amongst other things, the interests of the members of the Committee. I wonder whether, for the record and because this is being webcast, I could just ask you both to introduce yourselves and say who you are. Then, if we may, we will go straight to questions.

Mr Lammy: My name is David Lammy. I am the Minister for Culture in the Department of Culture, Media and Sport.

Lord Sainsbury of Turville: I am David Sainsbury and I am Minister for Science and Innovation in the DTI.

Q421 Chairman: In its review of the DCMS by the Office of Science and Technology a year or so ago, it was noted that “with the important exception of social science, there was no co-ordinated strategic approach in DCMS to the use of science.” In the light of the fact that DCMS does not have the capability to consider science issues, OST recommended the appointment of a Chief Scientist. Why does the Department of Culture, Media and Sport, unlike most other Government departments, devolve its science almost wholly to its non-departmental bodies? Lord Sainsbury, I think it is now the office of Science and Innovation rather than the OST.

Lord Sainsbury of Turville: Yes.

Q422 Chairman: What is OSI’s view of the recent decision by DCMS to appoint a social scientist to this particular post, and, indeed, I believe, to make it only a part-time post?

Mr Lammy: I think it is important, when asking the question of the DCMS relationship with its non-departmental bodies, to be fair and open about the historic role the Department of Culture, Media and Sport has played. It has never been the case in the Department of Culture, Media and Sport’s history, as it were, that it intervened in the agencies charged with improving the cultural and sporting life and the heritage life of our community. That is because the royal statutes and the statutes that set up our

museums, the Arts Council, English Heritage, Sport England and others, in those debates in Parliament have generally made clear that we do not want the Continental model in this country. We do not want ministers deciding what we should see and hear and believe, and therefore there has always been traditionally an arm’s length approach between the Department and its non-departmental public bodies. Clearly, in relation to conservation and in relation to the science of conservation, it is right to say that English Heritage has played a lead role in terms of the built environment. It is right also to say that our museums—and I think here of the British Library, the Natural History Museum, the V&A, the Tate—have had a key role to play in the conservation and the science of conservation. Indeed, it has been in their interests to play an important role in that area. Our relationship with them has been through our funding agreements, it has been through determining with them that they should be engaged in research and conservation, but, in a sense, they are the experts informing us. We do not seek to duplicate that effort with a layer of governance centrally within the Department, because that has simply not been the historic relationship we have had with them. I think it is also important to bear in mind that, if you just look at the spend of English Heritage and the Natural History Museum, which do the lion’s share, I think, of this work, we are talking about £9.8 million on conservation science. That is very different from the £3.3 billion spent in the DTI. There is, importantly, a genuine understanding about scope and range and what the traditional powers have been. Sitting back, as the Minister, I am very pleased of course to see the developing English Heritage strategy in these areas—keen and pleased. When I visited the V&A last week, I was at the Northcote Storage Plant in Earl’s Court looking at the work of the Science Museum and the V&A around conservation; I am very aware of what the British Library has been doing with the largest conservation department of its kind anywhere in the world; and English Heritage is a world leader. In a sense, I think it is right to say that the picture has been positive, but I am sure there is more we can do, and in that context I welcome the suggestion that we should have a Chief Scientific Officer. Clearly, in

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relationship to the Department, if the Department is to have an officer it should be someone who can deal with sports science, who can deal with climate change—the excellent work that English Heritage has been doing in this area with some of our archaeologists, and, indeed, climate change was also a feature of some of the work that the V&A have been doing about the state of the environment in some of our museums—but also who can deal with the lion's share of social science as well as the hard science work we have got. It is important that that individual has credibility and it has been right that we consult and talk about what the specification of that job should be.

Lord Sainsbury of Turville: I think it is now agreed that we are proceeding, in terms of recruitment of the Chief Scientific Officer, on the basis that he should be someone who can look after the hard science as well as the social science part of this. That is probably the skill that the Department is missing: it does actually have very good social science but it does not have anyone with the hard science background. As far as part-time versus full-time, almost all the Chief Scientific Advisers are in some sense part-time—David King spends Fridays in Cambridge doing research—and we have always rather encouraged that because it means that they (a) come on doing some science and (b) remain in contact with the scientific community.

Q423 Chairman: I am glad to hear that. It seems to us, as you have rightly pointed out, that you have a good deal of hard science in, for example, the Natural History Museum. Certainly, as far as the investigation to date is concerned, what has struck us is how important it is to marry up the hard sciences with cultural heritage, and, in many senses, both in terms of our understanding of the history of that heritage and in terms of other people understanding it and making it accessible to the world, how important a role science can play. We have been a bit disturbed at the thought that it might be somebody just with a social science background.

Mr Lammy: I think the key thing is that it is an individual who should have credibility across the sector. That is the first thing. I do hope that the individual is able to draw on the huge expertise that sits on the boards of some of our non-departmental public bodies. If you think of the trustees of the Science Museum, the Natural History Museum, the British Museum, the Museum in Liverpool and others, you have a range of expertise there, a whole raft of scientists with engineering backgrounds, with hard science backgrounds, with medical backgrounds, and we need to utilise that. That is something on which the Chief Scientific Officer can draw and I hope we can move that appointment as quickly as due process allows.

Q424 Lord Paul: Given the overarching responsibility of the DCMS for our cultural heritage, would your Department be an intelligent customer of good science, for using the science?

Mr Lammy: As I have said, in DCMS we have a range of bodies with huge expertise within them. We have not traditionally been in the business of prescription about the nature of that expertise. It is right to say that there has been real advantage in relation to the built conservation heritage that is at the mercy of the country, that is deeply beneficial to our understanding of conservation and how we preserve buildings, which is really something that the world and certainly European countries look to us very much to lead on. I think it is right to say also that our Museums, Libraries and Archives are keen to play a more strategic role, coming out of the expertise of those bodies. I want to see that work develop and I certainly think there are institutions that can play a real lead in the sector, so that we as a department are certainly making our contribution to the science. In that sense, we are a customer. We are a customer that I hope delivers for the country, and I think the Committee is right to concentrate on this important area and say, "Yes, we are good, but we can get better."

Q425 Lord Paul: I think we are trying to get at who in the DCMS is capable of drawing on the sort of scientific expertise within the NDPB with a view to policy making and influencing other departments at a senior level.

Mr Lammy: Our statutory relationship with, for example, English Heritage means that English Heritage is able to have dialogue with other departments—and principally it has dialogues with Defra and with ODPM—to make clear issues of conservation. Indeed, I was in Turnpike Lane Tube Station four weeks ago with English Heritage and their stakeholders at that point, London Underground. They were explaining to me why they expected the tiles to be conserved in a certain way and the conservation techniques that go into us having one of the most beautiful underground networks in the country. They are engaged in that dialogue on a day-to-day basis. They are able to take a strategic view, which means that there are issues that relate to the countryside and preservation issues that relate to our cathedrals that they have been able to make a contribution to that are cross-cutting and influence the work of other government departments. In the same way, to take the British Library—which has the largest conservation department: 80 people employed, looking to have a state of the art facility, a modernised facility by next year—the British Library is sponsored not just by us but by our key partners in the DTI and Education as well. It has always been the case that our NDPBs have a reach

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beyond our Department. I think we can do more in relation to Museums, Libraries and Archives. They have launched an evidence and research strategy which is a sign that they can do more. That overarching body which encompasses our museums and libraries, it is right to say came out of a peer review. They needed to change, have changed, have regionalised, and are coming into a place where they provide that more strategic direction.

Q426 Lord Paul: Would you consider that English Heritage and the British Museum were doing the job for you?

Lord Sainsbury of Turville: Could I come back from, as it were, the research side. The first thing to say is that there is a lot of good conservation research going on. If you take the V&A or the British Library, world class and very good conservation research is taking place. We also, of course, have English Heritage producing essentially a strategy for the built environment. There are a lot of good things going on. Obviously the whole point of suggesting that there is a Chief Scientific Adviser is to have someone at the departmental level who, without laying down what should happen, can manage the situation and make certain that across all the different bodies there is a common strategy. I would think that one of the first things he would want to do would be to have, on the moveable side, someone producing the same kind of strategy as has been produced on the built environment. I think one needs to see that there are a lot of good things going on but one of the things the Chief Scientific Adviser could do is to make certain that on the other side of things there is a comparable strategy to that which we have on English Heritage.

Q427 Chairman: Lord Sainsbury, you have said that the view is now coming down to having a hard scientist. Is this agreed with the DCMS, that it should be someone who has a scientific training?

Lord Sainsbury of Turville: We want someone who can do both. In terms of what already exists, there are very good people doing the social sciences in the DCMS. It is probably more important that the person is from the hard sciences than the social sciences, but, of course, we need to be able to command respect in both of these.

Q428 Lord Chorley: Given all this, the part-time aspect remains, it seems to me, a bit worrying. Unless it is to be—as practically everybody around this table knows who has been asked to do something—“It is only part-time” but you know it really is not, it is virtually full-time. I imagine Sir David King is not one day a week; I should think he is more like four and a half days a week.

Lord Sainsbury of Turville: I think one wants to be clear: there is a need for this expertise but it is of a fairly strategic kind. I do not think it is necessary to have someone absolutely full-time on this but you do need some kind of resource at a high level.

Q429 Lord Chorley: It is more than a couple of days a week.

Lord Sainsbury of Turville: The important thing is the calibre of the person, not the number of hours they work. This is typical of most of our scientists and Chief Scientific Advisers: the main problem, if they are totally full-time, is that you find they lose contact with the scientific community. That is much more of a problem.

Q430 Lord Redesdale: You have said you do not need somebody full-time but we are talking about a very large area of expertise in conservation from the British Library through to archaeological artefacts. I do not see how anybody can cover all those. It is a job in itself.

Mr Lammy: Let us be clear on this. I have said—unless the Committee is suggesting this, and I suspect it is not—that there is no appetite and no desire and it was not the recommendation previously to duplicate governance that exists in both our strategic body in terms of the museums, libraries and archives and our individual museums. I do not think the Committee is suggesting that we duplicate that governance and we are not intending to do that. There is much good work going on now. I think it is important to have a Chief Scientific Officer drive that work and champion that work, having credibility across the sector, but it cannot be right, when you look at the spend that our Department has in this area relative to other government departments, when you look at the experts and expertise that exists in the British Library, the V&A, the British Museum, English Heritage and others, that we should come and duplicate that effort in the Department. Indeed, when other departments do not have a full-time Chief Scientific Officer, that we in the smallest department should choose to have one that is full-time, cannot be right.

Lord Sainsbury of Turville: To be clear, this is a common policy now across government almost. We now tend to bring people in as Chief Scientific Advisers who have had careers as researchers up to and including the time that they become Chief Scientific Advisers. That, frankly, works much, much better than the situation we have sometimes had in the past, which is where people have worked their way up through a department and become the chief Scientific Adviser. The danger of that is simply that they have not done any research for 30 years and have none of the contacts. This is a common pattern and it works well across government. Frank Kelly, who is

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the Department of Transport's Chief Scientific Adviser, I think works three days a week. It is the calibre of the individual and how much research they have done recently that counts and not the number of hours.

Q431 Lord Redesdale: Who at the departmental level is going to act as a champion. You say you do not have a Chief Scientific Adviser, and we have taken evidence from a large group of people who are saying, "DCMS sets our strategic aims and our goals but there is not anybody within DCMS who has that champion role, we feel." It seems that a lot of people are complaining about this. I specifically mention this because it is not written as one of the strategic objectives in DCMS. Conservation is not mentioned as one of the strategic objectives.

Mr Lammy: I hope we are not being confused. We are saying that we want a Chief Scientific Adviser and we intend to appoint a Chief Scientific Adviser, and that appointment will certainly lead to championing. We are saying that the Museums, Libraries and Archives have moved out to have a research and evidence-based strategy that is both about co-ordinating the work that is existing, profiling what exists on the database, pointing to expertise and leading also to a future. We are also saying that. Clearly, they, as a strategic body, have a direct relationship there. That is two things. We are also saying, in relation to position on conservation, that no-one would suggest that conservation were not a huge part of the work of English Heritage, were not a huge part of the work of the British Library. Those bodies have come under our auspices and are doing very well in this area indeed. As I say, when I was at the V&A last year—this is a world leader, looked to by America, looked to by colleagues in Eastern Europe, leading in the area—they have this ocean scheme which is looking at the environment, leading in the area of laser work to ensure that we are conserving things to the best of our capabilities—notwithstanding the work that is going on at the Natural History museum. I do not want to undermine the good work going on, but I am sympathetic to you when you say that championing, particularly in the area of moveable conservation, is something that we can get even better at over the coming period.

Q432 Lord Redesdale: That is a helpful answer, but there is a slight dichotomy here, in that you have, on the one side, DCMS setting the strategic objectives for the NDPBs which actually guides where they spend their money, and on the other side you have said, "We do not have an over-arching experience and we leave it to our organisations." It gives the impression—and we have heard this in evidence—that there is a slight feeling that the guidance is not being given by DCMS.

Lord Sainsbury of Turville: That is the point of the Chief Scientific Adviser and that is why we are having one. That is the DCMS part of it. Also, on the Research Council side, having brought the Arts, Humanities and Research Council under the Research Councils, we probably have missed a trick in not clearly designating them as the lead Research Council on conservation. I think they are already beginning to take on that role. You will have seen in the evidence of RCUK that they are doing work both looking at the training needs and other needs on conservation. I think this is a case where we need to talk to them and say, "Look, this is happening, but it should be clearly understood that you are the lead department on this and should act as the interface between what is happening in places like the V&A and other museums and the research community."

Q433 Lord Chorley: I am moving on slightly, but it is in the same field. Is there a risk that with the huge focus on the Olympics in 2012 the cultural departments will get starved of funds? I say this against the background that there is certainly a limit. Non-Olympic sports, some in which I have been involved, have had their funding cut—just like that—100 per cent. Or do you think you can defend your quarter?

Mr Lammy: This is not something that I think needs defending. We are proud and absolutely delighted to have got the Olympics. It is an opportunity to showcase this country in a way that one cannot do with any other international opportunity in 2012 and indeed in the run-up to 2012. It is clear when you look at the success of the Sydney Olympics and the years thereafter and what that meant to the Australian economy, that our cultural sectors and heritage sectors will benefit hugely from the showcase that is the Olympics in the decade ahead. I think we should all be very, very grateful for that. That means extra revenue in terms of tourism; that means extra visits to the organisations that I have talked about; that means extra contacts and fascination in the heritage of this country. All of that is good for Britain. I think it is certainly not a situation—and ministers have been very keen never to be in that situation—where we have competing interest. I work very closely with the Minister for Sport because I see those interests as absolutely integral to the cultural heritage of this country. I think that is the context: a great effort to make sure that we pull off the best Olympics, but, when we pull off the best Olympics, all of our sectors benefit.

Q434 Lord Chorley: I am sure we can all agree with those sentiments but what is worrying is that in the meantime conservation funding may get pinched—I am sorry, it may be under pressure, and pinched in that sense.

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Mr Lammy: All I can say is that in the last spending review we were able to increase funding to our museums, we were able to launch Renaissance in the Regions. You will not find anyone in the country who will not say that the money we have been able to put into our regional museums to get the expertise and quality that we were seeing in our national museums replicated across the country, has not been a huge success, or anyone who also will not say that conservation is in a good place and we still remain world leaders. But it is right to say too, as a minister, that I have never been in a situation where a particular sector has come to me and not said, “We would quite like a bit more money, thank you very much.” Equally, I have to say, that, in this Department, when it comes to the spend of our non-departmental public bodies we have not been in a place where we have said, “You should ring-fence certain aspects of that money.” We have not done it for conservation. The Committee may have a view on that, but I say that if we were to do it for conservation then there is no other part of the work of our bodies for which we would do it. You may have heard those who are keen on acquisitions suggesting last week that we should ring-fence money for acquisitions. We have not done that. We have said, “Here is the funding and you spend it as you wish.” We have seen that English Heritage have spent 10 per cent of their £130 million on conservation; the Tate have spent 10 per cent of their money on conservation. So, across the piece, those decisions have been made by the experts themselves.

Q435 Chairman: Could I clarify this. Whereas the Olympics appear on your website as one of the objectives, as we noted before, conservation itself does not appear as an objective, although access to children and education and access to communities do appear as objectives. There is this feeling that there is a little bit of a danger that perhaps the drive for access is in itself taking money away from the important process of conservation. How would you answer that?

Mr Lammy: I answer that, if I may, very directly indeed. Why are we conserving those wonderful objects in the V&A. Why are we conserving the textiles and costumes? Why are we using the best techniques to conserve the jewellery? Why are we conserving those wonderful books in the British Library? Why are we putting the money we are into English Heritage to retain our beautiful heritage in the form of our cathedrals and our churches? We are doing it for the many, many people of this country, and we are doing it equally for the people in poorer socio-economic groups as we are for those who are not. That is why the Government has placed the emphasis it has on access. Right across the sweep, we have seen the attendance in our museums go up. That

is not just in London. It is not just tourists visiting our national museums. In Liverpool they have gone up by over 70 per cent. That is people from the poorest socio-economic groups. Unless the Government says that education and access is important, in the past it does not happen. You have to say it is important. We are conserving our heritage because it is for the entirety of the country. We understand historically that there will be some groups who fight to get that access. That is one of the reasons I came into politics. I would be very worried indeed if the Department were to recoil from that position.

Q436 Lord Redesdale: I think everybody is agreed that the increase in visitor numbers is a fabulous success. However, one of the issues that we have taken on board is that there is an ageing population of conservators. There is going to be a crisis in conservation. There is obviously the other side of the equation, that, whilst museums and archives and galleries are spending a lot of money on access, which is a good thing, that money is being diverted away from conservation. We have had evidence to the Committee on a number of occasions that that is the case. One of the problems we foresee is that this goes back to the strategic objectives that are set out by the Department. The Department, quite rightly, has been focusing on access, but, because that is a strategic objective, that is where the money is being spent and it is being spent to the detriment, unfortunately—and this is evidence that has been given to us—of conservation staff positions and conservation work.

Mr Lammy: We have the V&A working with, I think, 46 universities. It has a very strong relationship, particularly, with Loughborough. We have an HLF bid which has been successful, to see more training of conservation experts come on board. What I have heard, as I have gone around, is not so much that we have seen a diminution but, indeed, a demand that we have generated. The renaissance, if you like, that we have seen in the sector, indeed, places even greater demands on us to have the conservators coming through. I think also the Institute of Conservation—which I was able to launch a few months ago, bringing what has been a fragmented sector together in order to make the case for its needs—is important. I think it is also right to say that the Sector Skills Councils are working—and here DCMS is working in partnership with DfES—to assess the need across the cultural and heritage sector, so it is right to say that the needs in the conservation area need to be mapped and understood. We have some funds for extra training places, but it is right that I would expect, coming out of the cultural sector skills, more appreciation of what that need is. There are other areas of the cultural sector where there are needs. This is largely to do with where I think Britain finds

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itself within what clearly everyone I think agrees has to be a creative economy in the 21st century. We are responding to that, both in the short term and indeed in the immediate to long term.

Q437 Lord Winston: You have gone on a great deal about the big national museums like the British Museum, the Science Museum, the Natural History Museum, the Tate and so on. I wonder if I could ask you whether you feel the smaller museums have sufficient access to scientific advice with regard to conservation. Let me take as an example the exhibition in Bristol of the *SS Great Britain*, which is one of the finest examples of a mixture of science and engineering and an extremely difficult scientific problem in restoring the hull of that remarkable ship. Do you think, first of all, that the expertise they have developed scientifically is sufficiently spread around in general and properly published for other museums to follow suit? And do you think, in turn, that museums like that have sufficient access to proper scientific advice when they need it to get the best out of the exhibits that they are trying to restore?

Mr Lammy: The answer to that is we are on a journey. I do not think any minister could put their hand on their heart a few years ago and say that we were getting that right and that is why the Renaissance in the Regions Programme has been so hugely important to our regional museums. That is not just about extra funds to see a revival of our regional museums, it is about how we spread that expertise, so that the traffic between our national museums and our regional museums is more two-way and less top-down. I think that has been important. I think it is right to say that the picture has improved, but it can get better. And then I think we reach down even further to our local museums, who also say to me that they want a conservation capacity, that they do not want to feel isolated, and what more can we do. I think you are right to say that that is an area on which we had been weak. I think the Renaissance Programme is making a difference but the programme is two/three years old, so there is a journey there that we are embarked on. I think the example of the *SS Great Britain* in Bristol—a fantastic hull—using glass, using humidity and different techniques to preserve that—

Q438 Lord Winston: It is extraordinary.

Mr Lammy:—is an excellent example of what can be done and where we indeed can be world leaders if the money is going in. They got some of that money from the Lottery Heritage Fund, of course, which also will supplement the Renaissance Programme. It is excellent. That is why I say I am uncomfortable with this suggestion that somehow access means that all of this is forgotten—because it has gone on; it is just that

we want people to have access to what we are conserving.

Q439 Lord Winston: When you look at the budget of a museum like the *SS Great Britain*, it is absolutely on a knife-edge. A lot of the museums I have visited recently—and I have been to quite a few in the last month or two—all say the same thing about the knife-edge budget that they are facing and the difference between penury and insolvency and being successful with visitors is a very critical thing.

Mr Lammy: Two things flow from that. One is that conservators have said to me that there has been a rapid change over the last 20 years in conservation, which has grown, if you like, from a perception of being a craft to a perception now of being real, serious, hard science making an important contribution—and, indeed, a contribution such that some of the techniques we have developed, in terms of preserving the environment in our museums, have a direct impact on technological advances we can make vis-à-vis climate change world wide. There is a recognition there, but, also, with that growth, we have to get better at the co-ordination of that work, feeding down regionally and locally. When you put to me: “Can we see more of an over-arching strategy there?” I am not in disagreement with you; I simply say that the Department cannot be prescriptive about that. We look to the MLA and we look to our lead organisations and we look to the newly appointed Chief Scientific Officer to lead that work.

Lord Sainsbury of Turville: May I comment on the last two questions. The AHRC does fund quite a lot of professional preparation masters’ programmes. In fact, in 2005, there were 36 awards made to 17 different HEIs. That is down over the last few years, so that raises the query whether we are doing enough, but the answer is we do not know how many we need. In that connection I think it is very helpful that the AHRC is working and having consultation with universities and with museums and so on to establish (a) what are the needs for research and (b) what are the training needs. I think the AHRC work of consultation on this will give us two important answers here. One is: What are the training needs?—and then we can see whether we are doing enough or not. The second is: What are the research needs? Going to the second question, where there is a need for hard science to be brought to bear on these conservation issues, you find the Research Councils are very interested and very enthusiastic to co-operate but they have to know what it is. It is quite interesting that CCLRC, which is after all doing the very high-end research, is spending half a million of money in kind, allowing the use of machines like ISIS and so on to do this. We need to make the connections, but if we can make the AHRC the champion for this and also the interface with the

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research community that is probably the best way to deal with it.

Q440 Baroness Hilton of Eggardon: First of all, I would like to make a comment about the increased access, because increased access does mean that you damage what you are treading on, looking at or breathing on and so on, so, in a sense, there should be some sort of balance between conservation and increased access. I think that is an important aspect and amongst your objectives should be conservation to balance the increased access. You have been saying that English Heritage has a developed strategy for dealing with the built environment, but there is no such strategy for dealing with the moveable environment. Obviously excellent work is going on with individual museums and the British Library and so on, but it is not integrated, and I am not at all clear what the role of the Museums, Libraries and Archives Council is, unless it is to set a strategic direction for those organisations. I wonder whether you could explain how you see its role and why it has not developed a strategy so far.

Mr Lammy: The point you make about increased traffic—increased footfall, as some people call it—is a point well made. That is precisely why I welcome the work that the V&A, in partnership with some of our other national museums, is doing on vibration and the effect of visitors and indeed builders. Most of our national museums have had huge building programmes over the last period and that does lead to issues. Our conservators are looking at that, so they are on the ball. Yes, you are right to say that the MLA has an important relationship. I point to the peer review of the MLA which meant that the MLA needed to do some work as an organisation to get better and stronger. It needed to have better regional reach, and it has done that through the MLA partnership. I think it is now emerging to deal with some more of these strategic issues. I welcome the work they are doing now on evidence and research; their desire to see better co-ordination; their desire to have a retro database (effectively a list of conservators). They are looking at the impact of the work that has been done—which informs, indeed, the next spending round. That is absolutely important. When I talk about the role of individual national museums, it is the same, but none of them, when I have talked to them, are working in isolation. All of them are working together. Indeed, at the V&A last week, where they have a chemist, a physicist, a polymer specialist, they said to me, “In an ideal world we would quite like a biologist, but actually we work in really close partnership with the Natural History Museum next door which has a lot of that expertise.” Part of any strategy, I suspect, is also about how as a family of museums the joint expertise is a serious critical mass in the area of conservation.

Q441 Baroness Hilton of Eggardon: Clearly that applies in relation to the large museums in South Kensington, because they are next door to each other and they know each other and they are a community, but it would not apply to smaller provincial museums in other parts of the country which do not have those sorts of obvious communication links. I would have thought that part of the role of MLA would be to set up a database, not just of people working in the field but also of methods of conservation and ways of doing things and so on.

Mr Lammy: Methodology is also part of the evidence and research strategy that we are outlining.

Q442 Baroness Hilton of Eggardon: But they have nothing like that at the moment.

Mr Lammy: No.

Q443 Baroness Hilton of Eggardon: I think it was agreed that there would be a scientific adviser in DCMS something like eight months ago. As I understand it, you have not even drawn up a proper job description yet. Is that right?

Mr Lammy: There has been a delay and I have to acknowledge that there has been a delay. That delay has been, as I have said, because our department finds itself historically in a different place from other departments. It has had to consult widely with the many, many, many non-departmental public bodies that come under it—again, an unusual amount for a small government department—and it has had to take a view as to what does the credibility of this individual look like. We have done that, we have achieved it, and we move on to making that appointment as soon as is possible within the due process rules. I give the Committee my assurance on that.

Q444 Baroness Hilton of Eggardon: What does that mean?

Mr Lammy: It means a specification.

Q445 Baroness Hilton of Eggardon: In terms of time limits, I mean.

Mr Lammy: Lady Hilton, you know that ministers do not give time limits because these things depend on adverts, they depend on the appointment process, they depend on rules and prescription. But let me give the Committee the undertaking that we will have made that appointment by the autumn.

Baroness Hilton of Eggardon: Thank you.

Q446 Chairman: You have made clear in our discussions so far that English Heritage are taking the lead in terms of the immoveable heritage and developing a strategy there. It really does not make sense for there not to be a strategy for the moveable heritage. Again, we have touched on this, but I would

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like you perhaps to expand a little bit on how you see such a strategy developing, in particular in relation to more fundamental research on things like materials and the safe movement of materials, which is really applicable to both regions, both the moveable and the immovable.

Mr Lammy: It is very difficult for me, as I have said, to be prescriptive about what that strategy should be because the expertise has traditionally not lay in the Department. I have to come back to saying that our relationship has been through our funding improvements with our non-departmental public bodies. The Museums, Libraries and Archives have a key role here, but I think I would be treading too far if I started then to go on to say that I would expect to see work around metal conservation, textile conservation, intervention conservation, and if I started to prescribe what that work would look like. Indeed, I think I would probably be straying beyond my own expertise as well.

Q447 Chairman: Given the interactions, does it make sense to have two separate strategies?

Mr Lammy: I see a huge amount of joint working between our very big NDPB, so that the Arts Council, English Heritage, MLA work very closely indeed. Indeed, the appointment of a Chief Scientific Adviser enables that to happen in a really meaningful way, and I would expect to see that, going forward.

Q448 Lord Redesdale: The Chairman of English Heritage, Sir Neil Cossons, in evidence said that English Heritage would be willing to take on the role as secretariat to the Chief Scientist between all the public institutions of the moveable and immovable sectors, looking at how scientific research could take place in this area. If you were to look at his evidence, would you welcome that English Heritage should take on that role?

Mr Lammy: I will look at it.

Q449 Baroness Finlay of Llandaff: I apologise to you that I arrived late, and I hope that my questions are not going to duplicate anything which was said before I came. We have heard quite grave concerns in taking evidence that overall there is a shortage of resources to fund conservation research. I wonder if you can fill in for us whether that is something that you, as a government department, recognise, that there is a shortage of resources both in terms of finance to fund it but also in terms of some of the very expensive equipment that is needed for some of the conservation techniques and access to that equipment and, indeed, in terms of people, and what the Government is doing about it or how you plan to address that.

Mr Lammy: I have said that the budget that we have given to our national museums has increased, and it has. We do not ring-fence those budgets as to any aspect and so money is spent as the experts in those organisations determine for their needs. Indeed, that increase in the budget has not just been to our national museums; it has also been to our regional museums through the Renaissance in the Regions Programme. English Heritage, as an organisation, has been able to make significant efficiency savings and it has been able to reform and modernise significantly as an organisation. They had a difficult and challenging quinquennial review four years ago that said that they were a body that needed to do that, and, in that context, they have not seen a rise in their grant in aid but they have been able to review some of their processes to put back into the organisations. That is the overall envelope into which these organisations are operating, not withstanding the relationship they will have with the AHRC.

Q450 Baroness Finlay of Llandaff: With that block of money going to them and the strategy coming from the Department in terms of the way you would like to see museums going, how are you monitoring the balance between the way your strategic direction is being met and the way that the other obligations, such as conservation and science which underpin the long-term, are being funded out of that budget? It is the monitoring mechanism that I am not really clear about, and how you get the balance between the pressures from the departmental strategy and ensuring that they do not override other concerns so that you do not get a short-termism of spending.

Mr Lammy: The monitoring comes back to the funding agreements that we strike in each individual museum—and those funding agreements are public—and it comes back to the overall health of the sector. I have looked through the evidence that has been given to you, and, as I have said, there are areas where I think we can make improvement. I think the Chief Scientific Adviser will achieve that. I think the MLA moving forward with its evidence and research strategy will be important. Perhaps part of that process is greater formalising the co-ordination that is going on between our museums. But, standing back, on any objective analysis the health of our cultural sector is better and stronger in this country than it was 10 years ago. It just is. You only have to wander down the road to the Imperial War Museum, to feel that. You only have to walk through to the Science Museum to feel that. All of our national museums are in the midst of a renaissance. That does not mean that they will not make a case to me, as the Minister, about how we can ring-fence part of the budget for acquisitions or how we can ring-fence part of the budget for conservation and some of the challenges that you highlight. But we determine how

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we are doing through the funding agreements and this is a sector that is demonstrating real health and making a real contribution. If you look at the facilities that the British Library are going to open next year, the conservation there is not just for the benefit of the expertise of them as an institution; it is also to educate the public and young people. At the V&A they are talking about young people coming through and seeing the work of our conservation experts. All of our museums now having huge education outreach into the community that never existed before. English Heritage have spoken to me about real demand from the public as to how the public themselves better conserve textiles or better conserve the brassware and silverware that they have in their own homes, and how can they be more engaged in teaching and educating the public. It is right, that there are more people saying. "We care about conservation." It is going beyond just those who are expert in the area, but people are demanding it in their own lives and saying it is really important. We see this on shows like *Restoration* and *Time Team*. The appetite is there. It may be, in a sense, that you are picking up some of that, but our assessment is that the sector is healthy, notwithstanding the structural arrangements which I think the Committee has indicated it would like to see, as have come forward from the evidence, that can get us to an even stronger place.

Q451 Baroness Hilton of Eggardon: I would like to pick up on the point about expensive equipment. I do not know whether you have been to the conservation department of the National Gallery but their electro-microscopes and everything else is all second-hand equipment which they have begged, borrowed or whatever from hospitals and other organisations. They need that sort of thing for analysing paint samples and materials and so on, the biological chromatoscopes and so on. All of it is second-hand and all of it has been put together with great ingenuity by the staff there. None of it is new or funded in any sort of way that I could see. We admire their ingenuity. I do think there are some places where things are not quite as sparkling and new as you are suggesting.

Mr Lammy: They have not made that representation to me. Now I have heard it from you, I will certainly make inquiries.

Q452 Baroness Hilton of Eggardon: Go and visit it. It is fascinating.

Mr Lammy: I have been to the museum; I just have not been to the conservation room.

Q453 Baroness Hilton of Eggardon: It is the National Gallery.

Mr Lammy: I must confess, I have not been to the National Gallery.

Q454 Baroness Finlay of Llandaff: Could I come back to the monitoring question. I am just wondering whether you are asking the question on an annual basis of museums that have funding to specify what their activities are in relation to conservation science and how much collaboration there is between that individual museum and other museums. You have given us an example of it, but I wonder whether that is a routine question now which is going out to those museums, so that it gets raised really at senior level as a routine, almost as an agenda item.

Mr Lammy: First, we do not set their funding agreements every year. It is every three years, from my recollection. We do a health check, as against the funding agreements, as we go forward. We are not prescriptive when dealing with our experts on the detail of that.

Q455 Baroness Finlay of Llandaff: I was not thinking of the detail; I was thinking almost of the headline that is in there with all of them which would force it to be addressed and give you a comparative marker across museums.

Mr Lammy: As I said, our general feeling has been that this is a sector—and we have to look, do we not, across the piece as the Department? We cannot just look at one aspect of the Department's budget or of the individual gallery's budget or the individual museum's budget. We simply cannot do that because there are always competing interests. We have to ensure that the right people are employed, that they have expertise in the area, and that they themselves, with us, set their own goals. Across the sector, what we see is general health. Where there are huge issues that loom—and Lord Winston pointed to the regional context, and that I think is a serious issue that loomed three or four years ago—we have then, in negotiation with the Treasury, to meet the need—and we were able to do that in terms of Renaissance in the Regions—and move forward. We do a health check, yes. We are in close dialogue, absolutely. But we do not duplicate the governance at the centre of the Department for Culture, Media and Sport—which is still, I think, the smallest Whitehall department. We do not duplicate the expertise that lies there and we are not prescriptive with our museums on how they then spend that budget which is the determination that they and their trustees make.

I go back to what I said originally that traditionally in this country we have not been in a place where Whitehall in the shape of a department is too interventionist and too prescriptive about the nature of what should be taking place in terms of the cultural life of this country. It is very different to say that we

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would like to see people from poorer social economic groups enjoying our cultural life than to say, “You should spend your money on X”, or “Can you particularly have a look at metal conservation or textile conservation?” Traditionally, we have not been in that place.

Chairman: We appreciate that.

Q456 Lord Paul: Moving on to the 7th European Framework, what steps have been taken by both the Office of Science and Innovation and the DCMS to prioritise conservation science in the European Community?

Lord Sainsbury of Turville: I think I probably should take that because dealing with the Framework Programme is one of my tasks. Probably the place to start is that under the 6th Framework Programme about €16.4 million has been spent in this particular area. As you will know, over Framework 7 there will be a very substantial increase in terms of the total budget. This area of conservation science comes under that category which is called “Environment, including climate change” and we have now got to the stage where there is a general approach to the 7th Framework, or that is about to come next week. There will be a specific mention of the importance of conservation science under that heading. We think that heading, the environment part, will get a 30 per cent increase, so we should see a reasonable increase in that area of conservation science. That is something which we obviously keep an eye on in the Framework discussions.

Q457 Lord Paul: You do keep hammering the point on conservation.

Lord Sainsbury of Turville: Conservation always comes up as an issue and it came up strongly during our Presidency when we were discussing these areas and we made certain there was a reference covered in the text. These are not huge sums when you think it is spread over the whole of Europe over the period of the Framework Programme, but nevertheless it is an opportunity for people to get their money through the Framework Programme.

Q458 Lord Paul: Out of the £1 million that is being spent annually in the UK on scientific research for moveable heritage, around 46 per cent derives from the European Commission. Will such funding be available in the future?

Lord Sainsbury of Turville: I think you will see an increase in that amount of funding.

Q459 Chairman: There was, of course, a very substantial cut between the 5th and 6th Framework Programmes. In the 5th Framework Programme the amount that came through from the EU was approximately £28 million, and in the

6th Programme it fell down to £7 million. Although there will be an increase on the 6th Programme, it is still nowhere near the amount that came out of the 5th Programme which in itself generated a great deal of new work both in this country and in the other countries of the EU.

Lord Sainsbury of Turville: I was around at that time, but I do not remember getting into the detail of this at that time. I do not know what the arguments for and against it were and why that cut took place.

Q460 Chairman: We were hoping, and indeed from what you said, that there would be on the part of our Government a wish to see an increasing amount going under the Framework Programme in conservation science.

Lord Sainsbury of Turville: I think there will be. Certainly there will be more money going in, but I doubt it will restore the position. If, as you say, there was more in Framework 5, I doubt it will go back to that situation.

Q461 Chairman: Has the DCMS played any part at all in feeding into the negotiations on this subject?

Lord Sainsbury of Turville: Yes. When we do the negotiations on this, all government departments feed into those discussions.

Q462 Baroness Hilton of Eggardon: If we may turn to the role of the research councils, you have said already that the AHRC is going to play much more of a leading role. Last year only £450,000 was spent on research into movable heritage, which is a tiny amount for the sort of equipment that is needed for analysis. I wonder whether or not you thought that was adequate, particularly in view of what David Lammy has been saying about the importance of cultural tourism?

Lord Sainsbury of Turville: I think it is very difficult to comment on this because it depends. This is why the whole question of strategies for this area is so important because only at that point do you know what the scale of what needs to be done is and, therefore, whether one is doing enough or not. The answer is I think we do not have a clear picture of that. The Arts and Humanities Research Council is doing this consultation and I would hope out of that and the work that the chief scientific adviser will do we will get a picture of the scale of what the need is and, indeed, what the research priorities are for that.

Q463 Baroness Hilton of Eggardon: It has a tiny budget, of course, compared with the other research councils.

Lord Sainsbury of Turville: It is not that tiny.

Q464 Baroness Hilton of Eggardon: £75 million compared with £600 million?

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Lord Sainsbury of Turville: It has gone from £70 million in 2003–04, it will be £97 million in 2007–08 and £91.4 million in 2006–07, so it has done quite well in terms of what other councils also do.

Q465 *Baroness Hilton of Eggardon:* It was probably assumed its responsibilities were to do with written research rather than scientific equipment, was it not?
Lord Sainsbury of Turville: I do not think so. I think it is simply that it was coming into part of the research councils. I think, as we say, we rather missed an opportunity to say that conservation should be clearly one of its responsibilities and we will talk to them about that. It is happening, but I think we should probably make it clear they are the lead research council on this.

Q466 *Chairman:* Do you think it is likely that out of the discussions that are currently taking place there might be a ring-fenced programme on conservation science that emerges out of that?

Lord Sainsbury of Turville: If it was ring-fenced across the research councils, I do not think so because I think what is striking about the conservation work the research councils do is it is incredibly diverse, and to put all the things into a budget would make no sense at all. It ranges from pest control in trees, to new material science which is used in the building environment through to the use of ISIS neutron sources on conservation. It does not make any sense to put all of that into one single budget. I think a much more sensible way to proceed is to have a lead department. All the evidence is that the research councils are rather keen to co-operate on these areas. They had a recent workshop on this and I think there is great enthusiasm for it. One needs to make certain the interface with the conservation community in museums and libraries is working properly.

Q467 *Baroness Finlay of Llandaff:* Can I go back for a moment to this question about equipment that was raised and the very expensive pieces of equipment which are not widely available, some of which have come out of the health sphere that have passed their useful life in health. Is there an inter-departmental equivalent to a kind of equipment exchange or a log anywhere that is kept between the different departments so that equipment is not just possibly scrapped inappropriately early from one sector to another when it could have use? I know outside there are marketplaces, but it struck me there may be an opportunity inter-departmentally for some kind of logging or register.

Lord Sainsbury of Turville: I would be fairly certain there is not. I have never heard of one. I would have to say I think that is a bit of bureaucracy one would want to avoid at all costs. The idea that we have a

register of all bits of equipment in government departments—

Q468 *Baroness Finlay of Llandaff:* It was not in fact a register, it was almost to have like a government eBay really for equipment for researchers.

Mr Lammy: That sounds like an IT project.

Q469 *Baroness Finlay of Llandaff:* A web-based project.

Lord Sainsbury of Turville: What we have to do is be clear on what their needs for equipment are and to make sure they are properly funded. That is probably the way through this.

Q470 *Chairman:* Can I come back to the issue of funding for the research councils because, as you know, in addition to the AHRC, funding has been going to conservation science from the EPSRC and, indeed, from the NERC. Is there not a bit of a danger that if the AHRC becomes the champion for conservation science, that the other research councils will say, given the pressures on them, “We have now got the AHRC leading on this and we do not really need to give it the priority we used to give it”?

Lord Sainsbury of Turville: I think it is leading on it. It is acting as the interface with the community. It is having workshops to see whether we can align things better. I think the research councils are enthusiastic about it and will go on doing it. It will be seen to be helpful as it was seen to be helpful in this recent workshop the AHRC did which was extremely well attended by other research councils.

Q471 *Lord Chorley:* The workshop has been a sort of discussion group to compare notes?

Lord Sainsbury of Turville: To compare notes and see what the problems and opportunities are.

Q472 *Lord Chorley:* The unusual skills or skills which are known in some areas but not in the conservation world, that type of thing?

Lord Sainsbury of Turville: Yes.

Q473 *Chairman:* Can I also take you up on this whole question of ring-fencing on an inter-departmental or rather an inter-research council base. There have been a number of managed programmes that have cut across research councils which have been very successful and one does see very often quite a wide range of projects from pure engineering through to social sciences. Might this not be possible in this area?

Lord Sainsbury of Turville: I think one wants to encourage multi-disciplinary projects, and the way to do that is to get the relevant research councils working together, it is not to try and cover the whole field. As I say, it would be the most curious of budgets

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if you tried to put bits of all of the things that are into one budget. Where I think multi-disciplinary works best is if you have three or two research councils and say, "We have a common overlapping area and we will work together on that area".

Q474 Chairman: They often establish then a ring-fenced research council.

Lord Sainsbury of Turville: That is where it is a very clear new area of research. In this case, what we are talking about is using technology from right across the research councils which has no common theme to it other than it is used for conservation. To have a budget where you say, "We will put in £500,000 from CCRC plus £10,000 for pest research on timber plus something else" does not make any sense at all. As a whole, we rather like research councils to say, "We have a common area and we will both put resources in". How you would manage that across all research councils in this kind of area I think is impossible.

Q475 Lord Chorley: The corollary is that at the end of the day you are spending enough on conservation research in the heritage field.

Lord Sainsbury of Turville: Most of this is pretty applied research which relates to the particular areas and problems the particular museums and other places have. That is the starting point really. That needs to be properly funded. What the research councils can do is bring their knowledge in other areas of research, because they are not really in a sense doing conservation research, what they are doing is using their knowledge in areas like materials or Synchrotron radiation source to bring it to bear on a particular conservation problem. I do not think there is a problem about getting research councils to bring to bear their knowledge, the question is to align that knowledge with the problems which exist in the conservation field.

Q476 Lord Redesdale: We have heard that in the area of conservation science the profession is facing a crisis in a number of areas: there is a demographic problem with very few opportunities for career development and a shrinking number of posts which people, if they can find training, can fill. The problem is that I suppose we are facing a situation in the future that we are going to lose our skill and knowledge base as they retire. Who will be responsible? Is it the Government's responsibility to make sure that knowledge is not lost?

Lord Sainsbury of Turville: I think it is a case where we need a little bit of evidence-based policy. Until we know what the need is and what the state is, it is very much speculating as to whether we have enough or not. That is why the AHRC consultation, which is really studying what the problem is and

saying, "What do we mean?", has to be the starting point. When we have got that, we can start saying, "We are doing enough, we should put more resources in or not". The answer is we do not know and we should know, and that is what the AHRC is doing.

Mr Lammy: That complements the work that is going on with the Sector Skills Councils across the cultural sector to plot the needs for the next few decades. I think there is a lot going on in that area. That is notwithstanding short-term progress we can make to up training courses and, as I have said, we have received £1 million from the Heritage Lottery Fund to help in that area.

Q477 Lord Redesdale: I believe there are no master's courses in conservation in the UK at present.

Lord Sainsbury of Turville: There are plenty of courses in conservation.

Q478 Chairman: In conservation, but none in conservation science.

Lord Sainsbury of Turville: No, but the question is do you want them in conservation science or do you want them in conservation which has a large scientific element? I think that would be something which is debateable. There are courses in conservation which have a large scientific basis to them.

Q479 Baroness Finlay of Llandaff: Are there programmes, though, attracting people with a science background as their first degree or are they particularly attracting people with an arts background?

Lord Sainsbury of Turville: I do not know. We can see if we can find out. I do not know if there are any statistics which can give us the answer to that question. I certainly do not know.

Q480 Baroness Finlay of Llandaff: I was just thinking that if someone comes in with a science background, then whatever projects they undertake as part of a master's programme they will be bringing in their previous scientific approach and thinking, whereas if courses run on conservation and techniques they may get lost.

Lord Sainsbury of Turville: To tell you the truth, there are a lot of people working in this field who have a scientific background. We have had evidence from people who have clearly come from chemistry or other areas in this field.

Chairman: Yes, having spoken to a number of those who did conservation science from having done an undergraduate degree in hard science, they often do conversion courses to go on training courses in conservation.

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Mr David Lammy MP and Lord Sainsbury

Q481 Lord Paul: My question is nothing to do with the Committee. Minister, can I congratulate you on your passion for and commitment to the Olympics 2012. I am sure we will build a new heritage for future generations. As Chairman of the Olympic Committee, I am delighted with your commitment.

Mr Lammy: Thank you very much.

Q482 Chairman: Can I thank you both very much indeed for coming this morning. I think we have had an extremely useful session. I am sorry we have been pushing you so hard on a number of topics, but from our point of view it has been extremely useful. Thank you so much.

Mr Lammy: Thank you very much.

TUESDAY 6 JUNE 2006

Present	Sharp of Guildford, B (Chairman) Chorley, L Paul, L	Platt of Writtle, B Redesdale, L Young of Graffham, L
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Memorandum by the Natural History Museum (NHM)

INTRODUCTION

The Natural History Museum is one of the world's greatest resources for reference, research and information on the natural environment, guardians of a 70 million specimen collection of living species, fossils and minerals, a powerhouse of scientific research, an institute for inspiration and creativity that annually welcomes millions of scientists and visitors.

The Natural History Museum is an iconic British institution and a core part of our nation's heritage. Using the definition of "cultural heritage" provided by the Committee for this inquiry, the NHM can almost encompass the definition in its entirety: our listed buildings contain precious works of art, books, manuscripts, records and millions of natural history specimens.

CONSERVATION SCIENCE

1. The study of the collections of the NHM has directly shaped our culture. Our view of ourselves and of our place in the world has been shaped by the scientific ideas that have been generated by our collections. Our science is on the cutting edge. Our collections represent the breadth of the outside world in a dynamic and active system for organising knowledge. The NHM believes that the broadly understood definition of "cultural heritage" should include natural history objects. Natural history materials bring not only scientific understanding of the world around us but also add social, aesthetic and historical value to public understanding of science. Many items held by the NHM are part of the nation's cultural heritage as iconic, historically significant collections in their own right, for example, the collections of Charles Darwin, Sir Hans Sloane, Joseph Banks and Alfred Russel Wallace.

2. At the NHM, the collections are seen as the infrastructural support for our natural history research and public offer. Improved levels of object conservation enhance the access and availability of the collections.

3. Natural history collections include botanical, zoological, palaeontological, mineralogical, anthropological and entomological collections, and their associated archives, and provide a resource that underpins research into the biodiversity and geology of the planet. After archives collections, natural history collections comprise some of the largest collections in the UK. The resource is finite and expensive to maintain due to the costs of collecting and the maintenance of the holistic data that natural objects hold. Natural history objects represent some of the most physically sensitive of materials and improving methods of preservation is vital in maintaining their value as objects of cultural heritage. Conservation science in natural history takes a unique material science perspective, viewing specimens as composite materials. Natural history conservation is focused on preventive conservation, rather than interactive (remedial) conservation, although remedial work may be required to stabilise objects for entry into the collections. Interventionist treatment of a specimen can cause damage to the core data that the specimen holds. Natural history collections are often held in older buildings and hence, the monitoring of the condition and maintenance of these buildings is critical to the conservation of the objects. New approaches that reduce invasive stabilisation of museum objects, such as the use of lasers and anoxic environments, focus on the preservation of the maximum amount of data in a specimen and lead the conservation profession in both ethical and practical approaches (see case studies that follow).

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

4. For arts, archaeology and archives, conservation science is co-ordinated throughout the UK by the Institute of Conservation (ICON), large national institutions (such the British Library) and, to a smaller extent, by several Universities.

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5. The main body co-ordinating collection management issues for natural history collections in the UK is the Natural Sciences Collections Association (NatSCA). This group meets annually and represents natural history conservators. In addition to this, there is also a small informal group of natural history conservators who provide training and focus for development.
6. There is no formal co-ordination of natural history conservation research. The NHM and the University of Cardiff are, to our knowledge, the only bodies undertaking direct natural history conservation research in the UK.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its Cultural Heritage for future generations?

7. Most of the funding for natural history conservation research is internally generated and comes from institutional commitment to preserve collections. New projects such as the SYNTHESYS Network Activity C on Collections Standards (funded by the European Union) are slowly raising awareness of the benefits of improving access to natural history materials through improved levels of collections care and management.
8. There are however, no direct funding sources that support research into the conservation of natural history materials. Avenues such as the Arts and Humanities Research Council (AHRC) are not available to the natural history conservation community. There are a very few funding sources that can be applied to indirectly and none that support large scale initiatives in the UK. The private funding sources open to the arts and archives based fields (such as Mellon, Getty and Carnegie) rarely give funding to conservation projects on natural history objects and do not see natural history materials as an area of priority. There seems to be limited interest from the main users of natural history materials in lobbying for general conservation of natural history collections as important archives of natural history information.
9. The lack of available opportunity and available funding has meant that there has been limited externally funded research on conservation issues in natural history. Yet, the scope and range of problems relating to the preservation of information (for mineral resources, biological and other related areas) are vast and to date not really comprehended. This is an area that is wide-open to investigation with great potential benefits to the UK research community.
10. There are very few active natural history conservators undertaking research in the UK. The few active researchers at the NHM represent nearly half of the skilled researchers in this area in the world. The natural history conservation field is largely dominated by individual collection management staff who specialise in collections care rather than specialist (materials) conservation. Consequently, there are very few trained conservation science researchers in this area. Because of the lack of trained conservation staff (and lack of positions available) in natural history, support for research to investigate new areas of specimen preservation is very limited. The NHM is developing lists of projects that need to be undertaken on our collections in order to develop future research projects. Outside the NHM, there is also further research being undertaken at the University of Cardiff, focusing on botanical and zoological materials.
11. Conservation research in this area differs from other areas of conservation, as our aim is to support accessibility and research potential by preserving an object's inherent data, rather than merely preserving the appearance of an object. Natural history conservators rarely undertake restoration conservation, rather they focus on large scale preservation and preventive conservation techniques. The size of the collections (millions or tens of millions), general lack of individual commercial specimen value combined with high research interest dictates that the solutions to problems need to be larger and managed by a cost-effective strategy, rather than the object by object based restoration approach taken by arts-based conservators. There is a lack of recognition of the benefits that well preserved and conserved specimens (and collections) would bring to science.
12. This lack of recognition threatens the preservation of natural history collections throughout the UK, and more broadly around the world. Awareness of the value of good conservation practice in the field allied to the traditional areas of natural history (wildlife) conservation can only bring benefits to the research community. Limited natural history conservation research and a lack of understanding of the issues relating to the materials in this area reflects the broader lack of understanding of the range of areas that need to be researched

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in order to fully deliver professional conservation support. Conservators involved in the conservation of natural history materials need to enter into discussion with the range of users of these collections to be able to understand the requirements for future research.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

13. There are a small number of posts in natural history conservation and this means that the field is very limited. As current conservators age it is unlikely that this skill base will be developed or replaced. This threatens the preservation of natural history collections throughout the United Kingdom, and more broadly around the world.

14. Major natural history conservation research centres include the Canadian Conservation Institution (CCI), the Netherlands Institute for Cultural Heritage (Instituut Collectie Nederland) and in the United States, the Smithsonian Centre for Materials Research and Education (SCMRE). The Getty Institute and Parks America also lead in a co-ordinated programme of research in the United States. The United Kingdom does not have a central facility that undertakes comparable work. Besides these core institutions listed above, funding is also available for collections care and conservation work in the United States through the National Science Foundation. There is no similar source or level of funding available in the UK to support our collections of national and international significance.

15. The NHM has developed new and innovative techniques to monitor various environmental parameters. Notably we lead in the use of anoxic environments for long-term storage of objects. Our research work has been investigating new and innovative techniques that can be used to control storage environments. We are also members of the London Laser Consortium and undertake research on the use of lasers on natural history materials. Partners include the Tate, Victoria and Albert Museum and Imperial College London. The NHM is using this technology to reclaim damaged material that previously would either have been un-saveable or would have had to undergo a complex and damaging stabilisation process.

Is there a satisfactory process to develop practical applications of conservation research for the market?

16. Small numbers of staff and a lack of funding for the development of natural history conservation in the United Kingdom mean that there is not a satisfactory process for developing practical applications of natural history conservation research. There are limited research projects through informal consortia or independent research. These projects aim to offer pragmatic solutions and do not focus on long-term research strands aimed to develop practical applications for the market.

17. Commercial funding has historically preferred to invest in arts-based conservation research. The NHM is taking a lead on conservation research work (such as reduced oxygen environments and pest control) that focuses on the development of commercial products and approaches to ensure the preservation of natural history materials. The small numbers of natural history conservators and generally low level of awareness of natural history issues among the conservation research community mean that it is difficult for natural history conservation to compete with the higher profile arts fields.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

18. At the heart of the NHM's Darwin Centre project is the desire to enhance public engagement with and understanding of natural history. Through the design of the building, interactive media and live presentations by both science and conservation staff, the NHM seek to promote public understanding of the care and conservation required by our unique collection and the amazing resource that such a collection presents to both scientists and members of the public alike.

19. NHM conservation staff are enthusiastic about using materials science and natural history objects to improve understanding of natural history amongst children and young people. Projects currently in discussion will promote the use of conservation to explain material science at all levels of education, up to GCSE level and beyond. This will broaden the user base for our collections and promote an increased understanding of the care required by a collection such as the NHM's to a young group of people who are at an important stage in their educational development.

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20. As part of the general movement to make museum collections more accessible to the public it is essential that measures are taken to resolve “health” issues within collections. Conservation science plays a major role in ensuring that collections are preserved in a suitable environment that provides for maximum integrity of the object and its associated data, as well as ensuring accessibility. NHM led projects such as the European Union funded SYNTHESYS standards project focus on developing public access to collections through ensuring that collections are well maintained and well cared for. NHM staff have led in the development of a benchmarking strategy for natural history institutions that is aimed at improving access to natural history collections across Europe. In turn the NHM is developing a standards project based around the SYNTHESYS benchmarking methodology that aims to assess our standards of collection care so that we can ensure that resources are used in the best way and that accessibility is maximised.

CASE STUDIES

21. Conservation Staff in the NHM are developing a range of conservation monitoring and control projects as part of a programme to improve non-invasive stabilisation techniques for preserving natural history materials. This approach ensures the preservation of the maximum amount of data in a specimen and is cost-effective.

22. The NHM is collaborating with the British Library on a project to develop new techniques for monitoring and controlling oxygen and humidity levels around specimens that are sensitive to oxygen and humidity. The technology is developed from the food, packaging and pharmaceutical industries and allows institutions to maintain very accurate, passive controlled reduced-oxygen environments (ROEs). To date, design and development has focused on organic materials and practical applications have been developed for textile, archive, geological and zoological materials.

23. Working in conjunction with Cambridge Ultrasonics, the NHM has been undertaking small-scale monitoring of transmitted vibration through specimens on display in our galleries. The work needs to identify the extent of vibration at different levels across museum objects, the source of different levels of vibration being monitored and to develop new methods of monitoring transmitted vibration across sensitive specimens. The work has already attracted interest from other cultural heritage institutions such as English Heritage.

24. The NHM’s Integrated Pest Monitoring Programme is a world-leading initiative to control a major risk to collections across the museum. Fully integrated across all areas of the museum, including estates and housekeeping, the initiative has developed protocols and procedures for non-invasively managing pests (rodents and insects). The NHM has been zoned to identify different levels of risk and regular monitoring is now underway and integrated with management protocols across the museum. Staff are promoting this programme through public lectures and publications. The NHM also advises other national bodies on how to develop pest management plans. The NHM is collaborating with a number of commercial companies and also developing internal research projects to look at further non-invasive, non-chemical based methods of pest control.

25. The NHM is a key part of the EU funded SYNTHESYS¹ project aimed at improving standards of care for natural history collections across Europe. The final part of this project will focus on improving accessibility to and use of natural history collections. A standardised benchmarking procedure has been developed for use to assess the levels to which an institution manages and cares for its collections. This procedure also highlights areas of strength and weakness and identifies avenues to improvement.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

26. It is important to realise that the NHM website² has as many or more visits than our physical sites at South Kensington and Tring. The NHM website had over 10 million visits last year, with approximately 3.5 million unique Internet Provider addresses, and the website holds over a million records. Through the use of information technology the NHM has greatly increased access to its collections, making them available to a much broader and geographically diverse population, without compromising conservation.

¹ <http://www.synthesys.info>

² www.nhm.ac.uk

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27. The NHM is investing in significant levels of 2D digitisation of our collections, opening up our unique resource to a global community of scientists and other interested users. Use of virtual reality, for example 3D scans, will enable people to look at and interrogate objects from all angles. The NHM website displays a number of rotatable virtual museum objects that otherwise would be unable to be seen by the public, from the *Archaeopteryx* braincase, to rare meteorites, to an amazing glass model of plankton created in the nineteenth century by the Blaschka partnership that is currently undergoing conservation at the Museum and would otherwise be inaccessible to the public.

28. Together with a group that includes the American Museum of Natural History, Harvard University, the Smithsonian Institution and the Royal Botanic Gardens, Kew the NHM is part of the ground-breaking Biodiversity Heritage Library Project. This project aims to digitise the published literature of biodiversity held in the respective collections and to make that literature available for open access and responsible use as part of a global “biodiversity commons.”

29. Augmented reality, where virtual objects can be overlaid on to the physical environment, gives additional information about an object and allows the object a greater degree of interrogation and interpretation. This could be particularly relevant to sites of historic importance.

30. The use of haptic technology will enable people to have an even greater perception of how objects feel and work. This technology could greatly enhance understanding of cultural objects and how they function and would be particularly useful for the visually impaired.

31. The any place/any time/any means vision provided by ubiquitous computing has had an explosive impact on how people expect to consume and store information; capturing it, personalising it and repurposing it for their own use. People will also expect to download information at appropriate times and within context. The NHM is currently exploring this technology and is developing a number of pilots that use handheld computers to deliver information to the visitor as they tour the Museum. In future this will extend this to mobile phone delivery.

32. New forms of social interaction such as wikis, blogs and podcasts mean that information can be extended by a variety of sources. This encourages engagement with and literacy of cultural objects outside of the curatorial or scientific domain.

33. Use of remote accessed technology such as computer activated microscopes or remote accessed telescopes allow people to become involved at a personal level in discovering and engaging with objects.

34. The development of broadband and the convergence of digital technology mean that specialist subjects of cultural or scientific importance can be explained and broadcast to a diverse audience via the web. The NHM currently has over a hundred archived videos of presentations by both our own and visiting scientists on subjects of scientific and public interest. Without the convergence of this technology these programmes would not be shown by mainstream broadcasting networks and would thus be inaccessible to the public.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

35 All of the technologies discussed above could greatly enhance the user experience and give a better understanding of the value of cultural objects. However the delivery of such functionality is not seen as being core to traditional museum business and therefore museums are unable to develop these technologies in a strategic and coherent way. They are dependent on specific project and sponsorship funding which leads to projects often developing in a fragmented way. This approach makes it difficult to develop the sustainable funding needed to continue a programme after the initial pilot and also to develop long-term evaluation. It also makes the development of a coherent user journey, which interweaves all of these technologies, difficult to achieve.

36. Strategically many museums do not tie together their virtual and physical offering—they are treated as different spheres with little overlap. For museums to use the full potential of technology they must consider how this information technology can enhance the visitor journey across both the physical and virtual environment and ensure that they are coherently tied together.

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What, in the UK and Internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects.

37. The NHM is developing a strategic approach to ensure it meets the expectations of a 21st century audience. We have closely tied together both our online and physical offer to ensure creation of a virtuous circle between the virtual and physical space. On the web our visitors can plan their visit to our physical premises, while within the Museum a variety of kiosks, hand-held computers, and RFID tagging systems allows the visitor to capture information and book mark it for later access on our website. In this way, visitors can personalise the information they want to keep and access it at their leisure. When revisiting our website the visitor has access to a greater depth of information and additional relevant links. In the future, the use of RSS feeds will update the visitor to the latest events and exhibitions of interest. Through developing this coherent user-journey the NHM can extend and build upon our relationship with our visitors and increase their access to all areas of NHM life.

38. The NHM is continuing to explore how new technology can be used to make our content more accessible. In 2005 we launched a multimedia tour using a small PDA, or handheld computer. This tour allows visitors to understand in detail the remarkable architecture and history of this building. The use of this technology gives visitors a unique glimpse of the terracotta sculptures and gilded ceiling canopy, which would otherwise be unavailable.

39. A good example of new software that improves access to and understanding of cultural objects is Turning Pages. Turning Pages can provide a facsimile of a book and allows people to virtually turn pages, providing an understanding of the actual look and feel of the book being read. This allows increased display and examination of cultural objects.

40. The use of augmented reality in the Churchill Museum, where original archival documents can be pulled up and displayed, allows a greater number of people the ability to view and experience original documents.

41. MyArtspace allows visitors to discover more about the worlds of art, history and architecture by collecting objects on their mobile phone. The objects can then be sent to an online virtual gallery which can be shared with other users and added to later.

42. The Digital Gallery, Royal Ontario Museum, offers school groups an innovative education programs through a combination of digital media and interactive content narrated by ROM curators and educators. Students have a unique opportunity to interact with ROM objects that are otherwise inaccessible.

February 2006

Memorandum by the National Museum of Science and Industry (NMSI)

CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

There are various ways in which conservation science is co-ordinated in the UK. Conservation science in the UK is mainly co-ordinated between the larger national museums, galleries and libraries, training institutions (ie universities offering training in conservation or materials science or similar subjects), and professional organisations like ICON (Institute for Conservation recently formed by the amalgamation of UKIC and similar groups). The larger national institutions usually have dedicated conservation science sections, staffed by trained scientists and equipped with a comprehensive range of analytical equipment. Smaller museums also carry out research in partnership with the larger organisations and academic institutions.

Because conservation is a relatively small profession, there is a great deal of networking between members and agreement on areas of possible research. Periodicals produced by professional bodies such as ICON and ICC (the International Institute for Conservation of Artistic and Historic Works, based in London) are an important source of information of the work that is going on. Also, although to a lesser extent, websites of certain establishments are informative about the work carried out in their conservation departments, for instance at the American Institute for Conservation. Conferences set up by certain institutions throughout the year are also important in terms of professional networking. The other organisations that influence conservation research possibilities are the funding bodies, such as AHRC: a small group of conservation scientists meets on a regular basis, without a central co-ordinating body, and works within the other various organisations or groups mentioned above.

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In some countries, there is a central co-ordinating body for research and science, for example, the Canadian Conservation Institute, funded by the Federal Government. Internationally, the network for co-ordination of research and conservation science is naturally much wider and includes various large, international grant-awarding bodies. There is also co-ordination through industry producing products and techniques used in conservation.

Within NMSI the co-ordination is done formally through bodies such as the Collections Management Committee and informally through working relationships between the museums' specialist staff. The Science Museum, for instance, has sponsored 4 PhDs in areas of conservation science research and collaborated with other institutions on research. The staff also carry out small research projects as part of the ongoing treatment of the collections.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

Considerable resource is put into areas of fine and applied arts, and in aspects of archaeological conservation. There is now more focus also on the preservation of the built heritage and the contents of historic houses, etc. and also emphasis on creating the right environment for the storage and display of historic collections. Included in this is the built sustainable conservation.

However, if the overall preservation of heritage is considered there is room for improvement. Very little is put into research into the conservation of industrial, scientific and technological collections—except where the materials overlap with other specialist areas, for example there is considerable research into the preservation of new materials and technologies when found in contemporary art. This can then be applied to contemporary science artifacts.

In terms of capacity and skill base, there is also a real need for more trained conservators specialising in industrial, scientific and technological collections. These conservators will need to have knowledge of basic metalworking, woodworking, and engineering techniques and practical skills in order to be able to deal with the objects. Training and employing retired engineers and technicians to carry out conservation under the supervision of trained conservators can deal with some of this, but there does exist a real need to preserve the practical skills associated with the subjects. Also, specialist photographic conservators are now required in National institutions—given that photographs are now very much perceived as cultural artefacts in their own right and have specific requirements and needs. Furthermore, the whole area of new media conservation should be addressed. Many modern information carriers—be it optical or magnetic media—are already unreadable, and the equipment itself required to read these carriers is rapidly becoming obsolete and, in some cases, unobtainable. Electronic media conservation is a specialist field but serves a large audience—collections, archives, libraries, documentation—within the museum field. The research in this area is only at the preliminary stages, but will eventually require a large investment of resources if the 20th century documentation is to remain accessible.

Leading on from these points is the importance of applying “pure” conservation science research to the problems experienced by working conservators in the private and public institutions within the cultural heritage sector. Research carried out in laboratory conditions using contemporary materials as test pieces may not be directly useful to the conservators themselves. Therefore field-testing of products and methods should be regarded as an integral part of conservation research, and be considered as yet another area when thinking of funding conservation science.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

The origin of conservation has many of its roots in the UK, for instance, with the British Museum. New scientific techniques around the UK, for example the use of the laser for cleaning stone and new materials for consolidating artefacts, keep us on a level with other European countries. There are also a number of major initiatives looking at the environment that objects are displayed or stored in through a mixture of practical expertise and knowledge (research on condition assessment) with use of technology. There is also work being done collaboratively with international museums and associations such as SPNHC (Society for the Preservation of Natural History Collections) on risk assessment and the potential collections conservation and preservation. Furthermore, research institutions such as the Getty Institute in America have achieved a great deal both over there and also in the UK in funding and developing conservation science.

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More innovative work on the preservation of industrial and technological collections is being carried out in Canada, Australia and Germany.

Naturally, increased funding would allow for the application, research and development of more cutting-edge science and technology.

Is there a satisfactory process to develop practical applications of conservation research for the market?

Conservation is a relatively small field, and conservation research is even smaller. Although some companies have tried to develop and market materials and products for conservation, it is quite rare for them to be profitable. Even working with industry, for instance on developing adhesives for use in conservation, has not necessarily proved successful. It is usually easier to adapt industrial methods and materials for the purpose.

Undertaking commercial work in the hope of financing in-house conservation is possible, but to do this the balance between the market-focused work and work on museum collections would have to be addressed.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

There is scope for enhancing public engagement with science by educating them about conservation. The conservation of historic artefacts can be used to practically illustrate the changes that take place in materials, how this affects their appearance and properties and what the attempts to slow down the change are. This type of engagement is far more common in museums that deal with archaeology and art, rather than science and technology museums. However, the Conservation Centre in Liverpool has done such work with its public, and the National Railway Museum aims to, for instance at Locomotion, albeit in a minor way. The conservation workshops at the NRM in York have a viewing gallery, where visitors can see how vehicles are returned to working order. Although this activity would be strictly classified as restoration it is a good example of how conservators engage with the public.

The subject of family history could be utilised in order to further the public's interest in conservation science, for instance by using the professional conservation techniques for the preservation of their own personal materials. Through such initiatives the public could be drawn into an understanding of how science works and how it can benefit their lives.

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

Most museums have websites where conservation projects are listed, described in detail and some even have WebCams linked up so that the public can see conservation as it happens. It could even be possible to have discussions online about the ethics of conservation and preservation. For instance, at the Science Museum IT is used to enhance the collections documentation by upgrading the information on the database about the objects, incorporating the treatment information. Not only this but the most recent technology is used to laser scan the Babbage Difference engine to produce a 3-D image to assist replication.

Furthermore, techniques of RFID and bar-coding can be used for accessing objects without compromising the preservation—reducing handling reduces risk. 3D imaging can also be used for making an object visible, not only from all sides but possibly from inside as well. Also, IT enables museums to provide digital “surrogates” so that fragile material can be made accessible whilst being conserved and protected from too much handling. Local electronic digitisation databases, such as iBase at National Museum of Photography, Film and Television, have the capability to facilitate both surrogate access to more fragile works of art whilst sustaining key conservation data and research.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

There is scope for improvement in terms of documenting and recording more detailed information about the manufacture, materials, conservation treatments and preservation methods of collections, as well as for providing more images. However, if museums are to make use of IT technology for these purposes they will need more resources than are currently available.

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What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

NMSI, for instance, has already done a lot in terms of improving access to and understanding of cultural objects through websites such as *Ingenious* and *Making of the Modern World*.

Of course there is always room to improve, but the resources needed for managing digital resources and designing appropriate websites cannot be underestimated.

31 January 2006

Examination of Witnesses

Witnesses: DR MICHAEL DIXON, Director, and PROFESSOR RICHARD LANE, Director of Science, Natural History Museum; and MS HAZEL NEWEY, Head of Conservation, National Museums of Science and Industry, examined.

Q483 Chairman: Good morning and welcome. Thank you very much indeed for coming. I would like, if I might, to ask those of you who have come to give evidence in this first session to introduce yourselves briefly and then, if there is any statement you would like to make, to make that statement. Otherwise, we will go straight into questions. Does anybody want to make a statement?

Dr Dixon: We are happy to go straight to questions.

Q484 Chairman: Would you like to begin by introducing yourselves.

Ms Newey: My name is Hazel Newey and I am Head of Conservation at the Science Museum. For an explanation, the Science Museum is part of the National Museums of Science and Industry, in case people were wondering, with the National Railway Museum at York and the National Museum of Film and Television.

Professor Lane: My name is Richard Lane and I am the Director of Science at the Natural History Museum, so I am responsible for all our collections, our library and all of our research projects.

Dr Dixon: I am Michael Dixon and I am Director of the Natural History Museum, effectively chief executive, and I also have accounting officer responsibilities.

Q485 Chairman: I wonder if I could head off with the first question and ask you what do you see as being the key challenges affecting the conservation of natural history materials as opposed to man-made, cultural objects, and this is really addressed to Professor Lane and Dr Dixon? Then perhaps I could ask you, Ms Newey, what do you see as being the particular challenges affecting the conservation of industrial and scientific technological collections?

Dr Dixon: Clearly, from our perspective, natural history collections include items that were recently living and of course as soon as things die they start to decompose, so the first issue in the preservation of natural history materials is to prevent natural decomposition, so the commencement of the conservation process as quickly as possible is,

therefore, very important. It is also very important that we maintain as much data about the individual item as possible, so preserving an item in a way that is usable, including not just its morphology, but increasingly, for example, its DNA, becomes very important. There is also the issue of long-term storage in an accessible manner and making sure that that does not compromise the ability to study individual specimens. We have a range of storage issues. Natural history specimens are subject to attack from pests, they are subject to deterioration due to adverse environmental conditions, be that temperature or relative humidity, and increasingly we have to deal with changing legislation. For example, we can no longer use chemical pest prevention and that means that we have to develop new strategies for controlling pests that may affect our collection of items.

Professor Lane: I would only like to add that the nature of our collections is that we are interested in, if you like, the intrinsic nature of the item we are looking at, so we want to know the molecular or atomic structure (if they are minerals or meteorites from other planets). Also we need to put individual specimens into context of variation and one of the major drivers in natural sciences is to understand natural variation and from that we obviously deduce what we know about the world. I guess the other point to add to Dr Dixon's view is that the individual value, the commercial, monetary value of many of our items, and we have over 70 million natural history specimens, is actually relatively low, but the scientific value, we would argue of course, is extremely high and that, I think, puts a different context on the amount of effort that can be put into any one item and any one specimen versus a collection which may be much smaller, but the commercial or unitary value of each of them is much greater.

Q486 Chairman: You have a really unique collection at the Natural History Museum partly thanks to our Victorian forebears who went around the world collecting all kinds of things and bringing them back,

but it does mean that you have now a quite unique historical collection here.

Professor Lane: Yes, there is a historical dimension, but the Natural History Museum's collection is probably the most comprehensive representation of the diversity of life and minerals on this planet. If we took one particular element, and that is 'type specimens', they are the specimens where, when an organism is described for the very first time, that description is associated with an individual specimen. Our museum has the largest number of these gold standards in the world and the next highest probably is, and I have to say "probably" because we do not know, they are not as well known as our collection, would be Washington or Paris.

Ms Newey: The collections relating to the history of science, technology, industry and medicine are the physical artefacts, the physical remains of the development of scientific thought, so this makes them intrinsically problematic for us. This is a relatively new specialist area for the conservation profession. There is a wide diversity of materials used in the construction of the objects and they are mainly composite, made of metals, organic materials and ceramics. One of the great challenges is actually understanding the objects, that you are trying to conserve, how they were made in the first place, their complex structures, and there may be a minimum amount of information associated with them, so there is actually a great deal of research often to be done if you are conserving early pieces. Like the Natural History Museum, we also have problems with changing legislation regarding hazardous materials. For example, we have a large number of objects which are radioactive or have radioactive components. We have chemicals in our collections, we have biohazards and we have other materials, so conservators have to be constantly aware of these problems. Some of the objects are very large, for example in our large objects store at Wroughton, we have our collection of civil aviation. So we have everything from microchips to aircraft reflecting the diversity of the subject matter that we treat. If you look beyond our own collection, there is the immovable heritage as well that is dealt with, large machinery within structures. Conservation is also seen as a way of assisting the interpretation of the objects themselves. Often they are difficult to understand if you are presenting them to a non-specialist audience, so sometimes our objects are required to work again and cars run. We do not fly our historic planes, but some machines work which can make them understandable to non-specialists. This has its own inherent problems for conservation and preservation which is quite a detailed subject. We have moved towards collecting contemporary scientific artefacts now which have their own problems. There is a lot of black-box technology

among the artefacts we are collecting at the moment. We need to make sure that we have the necessary expertise and skills to be able to preserve them for the future, and we are looking at the question of allowing those to work or function. If we go back to the early artefacts, pre-20th Century, we have to consider the original engineering materials and the problem of dying skills, the practical hand skills that are perhaps no longer taught and need to be preserved in order for us to look after the objects.

Q487 Chairman: Can I just put in a supplementary which picks up on both sets of answers, which is how come the Natural History Museum is very much regarded as an international focus of scientific expertise, particularly with regard to the conservation of natural history specimens, whereas, as things have emerged, the Science Museum actually has remarkably little in-house expertise in scientific conservation work and capacity there?

Ms Newey: Do you mean for the conservation of scientific material?

Q488 Chairman: Yes.

Ms Newey: I think that is generally the case for most science museums throughout the world. The Conservation department in the Science Museum was set up in the late 1980s, and some of the museum technicians who were skilled cabinet makers and engineers were trained in conservation techniques. It is about uniting the skills needed to do the work. Actually we are known in other museums throughout the world, but we have not had the opportunity to develop the overall international reputation as the Natural History Museum has, but that is what we are looking to do in the future.

Dr Dixon: I think in natural history there is a very practical process of conservation that goes on and the need to resolve conservation problems has led to the need to do conservation research. I think it initially began very much as a needs-driven process and clearly our needs do not diminish. In fact our needs grow and, as new techniques come along, it is possible to do more with even the very oldest collection items and then we need to learn more about how to conserve particular facets of individual specimens.

Q489 Chairman: In science itself, the Natural History Museum has a very considerable research capacity.

Professor Lane: Yes.

Q490 Chairman: And you are an analogue institution for the research councils, for the NERC I think certainly and the EPSRC. Is this true of the Science Museum because I think it is somewhat less true that you have in-house science capabilities?

Ms Newey: Absolutely, we do not have that. We do not have the facilities to be able to undertake analysis and examination of objects, except on a basic visual and microscopic level. It is quite interesting that, when the present conservation section was set up in 1993, it was envisaged that there would be a scientific side. We recruited a conservation scientist to work on our collection of early plastics because this is recognised as a problem for the future. However, it is clear that scientists do not work terribly well in isolation and they like to work in groups because it leads to better exchange of information. So that experiment, if you like, was not very successful. We now work with colleagues in other museums who are doing similar research and support their projects, allowing them to use our collections and then we can feed in our expert knowledge, about the objects in that way.

Q491 *Baroness Platt of Writtle:* I am particularly interested in encouraging young people, girls as well as boys, into science and engineering, so I am very much in favour of your visits, your sleepovers, all sorts of things, and you had 700 women engineers there one night, a long time ago.

Ms Newey: Yes.

Q492 *Baroness Platt of Writtle:* Of course the film *Those Magnificent Men In Their Flying Machines*—I am an aeronautical engineer—gave a great boost to the Science Museum. This is long before your time, I am sure, but it meant that *Antoinette*, the star of the show, is in the gallery together with a whole lot of other aircraft, and I hope they are being well looked after because they are remarkable.

Ms Newey: Yes. In fact one of my female conservators, who comes from an object conservation training background, is presently working on the Floatplane S6B which won the Schneider Trophy in 1931. This is one of our aims for the future, to get people who normally restore planes to see that you can adopt a conservation approach so that—

Q493 *Baroness Platt of Writtle:* Do you get people from Brooklands?

Ms Newey: No, we do not.

Q494 *Baroness Platt of Writtle:* Because Brooklands have a lot of volunteers who do and at Duxford of course.

Ms Newey: Absolutely and we work very closely with Duxford. We have assisted with their training programme of volunteers on several occasions. It is interesting that, now that this female conservator has started working on the plane, she has got really interested in it and I think that is a very positive move and it is the sort of thing we should be encouraging.

Q495 *Baroness Platt of Writtle:* Even if it means another film to get people to come and visit because it is the visiting that is so important so that they realise how exciting it is.

Ms Newey: Yes, and the participation as well with the collections, we need to explore that as well.

Q496 *Lord Paul:* Where does conservation science figure, particularly with regard to the conservation of museum collections, within your organisation's strategic priorities?

Ms Newey: As I explained before, we do not have a conservation science section, but conservation science research is seen as an integral part of the conservation of the objects, so, for example, we are preparing an exhibition on the history of plastics which will open next year and, as part of that display, we are intending to include some information about the problems of looking after plastics, the deterioration of the material, and other topics. We are considering a possible project with the University of Surrey and their engineering department to look at further deterioration of plastic.

Q497 *Lord Paul:* What kind of funding is allocated and how do you allocate it within the two functions?

Ms Newey: Well, within the operational budget we have £10,000 which is for consultancy and that we can use to support the basic research or analytical work. We have to apply for funding from other grant sources if we want to do a large-scale project.

Q498 *Chairman:* But £10,000 does not get you very much consultancy!

Ms Newey: Conservators do not earn very much! We do have to apply for it, and I have just discovered how much a PhD will cost!

Q499 *Lord Paul:* In spite of that very small fund, how far is it autonomous, the small sum of £10,000, or do you have to discuss it with the government department?

Ms Newey: No, we can spend it as we see fit..

Q500 *Lord Paul:* How are you represented in that negotiation as part of the second Comprehensive Spending Review?

Ms Newey: I do not think I can answer that.

Q501 *Chairman:* Perhaps the Natural History Museum can come in.

Professor Lane: Certainly. We do have a specialist conservation laboratory in the museum, but I should also say that conservation in the life sciences departments is very much part of the overall curation of the objects and specimens that we have and it always has been. We do not break out a budget line specifically for conservation, and there are two

reasons for that. One represents the evolution of the subject, especially in the life sciences as opposed to the earth sciences. Secondly, in the earth sciences where we have our conservation laboratory primarily palaeontology and mineralogy, is where conservation started in the natural sciences. It started from material science and then grew out of that. Our conservation lab currently costs about £20,000 a year in consumables, plus salaries of just over £200,000 a year. Consumables for the conservation materials in the museum across the board are about £200,000 in materials which we can identify as being conservation materials. The total cost of curation and conservation in the Natural History Museum is £4 million a year, which is about 25 per cent of our total spend on science.

Q502 Lord Paul: Given that the focus of the Natural History Museum is natural science and that of the Science Museum is science and engineering, both very different from other national museums, how far do you feel that DCMS, as your sponsoring department, is able to provide you with strategic direction?

Professor Lane: We have quite a lot of dialogue with DCMS, but I should say that we are fairly proactive in our own connections through our conservators and also our very strong general research base, so we tend to set our agenda and then get international peer review for checking out that agenda, and that is our normal *modus operandi*.

Q503 Lord Paul: It is quite clear that you are fairly autonomous in the sense that you can carry on fairly independently.

Professor Lane: We are fairly autonomous.

Dr Dixon: I think it is fair to say that the responsibility for the care of the collections is enshrined in statute and our funding from DCMS is associated with a funding agreement which looks predominantly and historically exclusively at how the museum delivers strategic priorities or PSA targets for the Department itself. An initiative in the recently renegotiated funding agreement is the fact that we include in the funding agreement how we think we deliver strategic priorities for other government departments and in fact in that new funding agreement we make reference to work that we do that supports the work of DFID, DTI, Defra and the Department for Education and Skills as well. It is right and proper that we have a route for our funding, but it is also right and proper that we deliver a whole range of initiatives that support a whole range of government departments.

Q504 Lord Paul: I get the feeling that you have a very different method from Ms Newey's in the Science Museum. Is there any particular reason for

this? You are very autonomous and they are starving for funds.

Professor Lane: We are starving too of course! I think it goes right back to the very practical issue which I mentioned earlier, that our collections probably, without major conservation work, would deteriorate much more quickly than the kind of materials that you find in science, technology and engineering, so, by necessity, the conservation science research agenda is a pressing need for us and perhaps not quite so pressing in slightly different environments.

Q505 Chairman: If I can come back a little bit on the budgetary process, from what you have said in relation to the Natural History Museum, you work with the DCMS here and essentially your budget comes through them, but, as you rightly point out, you have well-established functions and you have links outside and in this sense the budget actually comes through. When we come to the Comprehensive Spending Review process, you may perhaps put pressure on others outside to make sure that your budget comes up at least to what you are hoping it will be. I think the Science Museum receives fairly substantial funds within the same process from the DCMS.

Ms Newey: Absolutely.

Q506 Chairman: What, I think, emerges from the discussion that we have had is that the part played by conservation science and the amount of your budget that is devoted to conservation science is relatively small as compared to the 25 per cent in total, which is curatorial and I realise that.

Dr Dixon: Yes, it is 25 per cent of our science expenditure, not 25 per cent of the museum's total expenditure.

Ms Newey: Can I explain the situation at the Science Museum? The annual budgets for conservation as a whole within the Science Museum are nearly £600,000, and that covers staff, materials and the running of the facilities we have. We do have conservation laboratories, but we do not practise what is understood by conservation science. We have facilities and staff who actually work on the collections and we use existing knowledge and expertise to carry out this work, but we have identified areas where we need to put time and money into doing research in order to preserve the collections better and assist in their interpretation, which is similar to the Natural History Museum.

Q507 Baroness Platt of Writtle: We are not getting the same picture and I think it is awfully important for our report that we do get the picture because clearly the Natural History Museum, and I am not in any way begrudging you that, has a national and international reputation. Now, the Science Museum

is a wonderful museum, so why has that not got a similar reputation in technology and engineering conservation because you are obviously doing the work and you are getting the money?

Ms Newey: It is because we have not been established as long as the Natural History Museum.

Q508 *Baroness Platt of Writtle:* Well, over 100 years.

Ms Newey: But it is to do with the change in the emphasis on the conservation of science and technology materials. In the past, the museum has employed craftsmen and engineers of the highest ability and they restored the objects to make them work to show the public. We have moved away from that now and we are saying that we have to look at the whole range of the collection, we have objects from pre-history up to modern day, so we need to preserve all those collections and we need to make them accessible, but we need to preserve them for the future rather than running them to controlled destruction, which I believe the National Railway Museum once said about its rolling stock.

Q509 *Lord Redesdale:* It is an interesting one, I can see, with an archaeological artefact where you have only got one of it, but if it is something that was constructed 100 years ago and you know how it was constructed, does it matter if you are replacing a part of that? Is there an ideological problem with that?

Ms Newey: I have to say it depends on the object, which is the great conservation get-out for everything, but we do have a lot of “type” specimens where you would not want to operate them, but you want to preserve them as they are. Many objects have been modified during their past usage and, if we are interested in recording the history of those objects and finding out what happened to them, then it is important to follow a conservation process rather than a restoration process. For example, locomotives are a really good example of that, where they may have had a number of boiler changes in their life, they have changed liveries as they have changed companies, similarly with other transport items. The conservation approach would be to do a forensic examination, much as we do with archaeological material, and then make decisions about how they would be conserved. If you like, we are adopting a much more holistic approach to the treatment of the collections so that we can get more historic information out of them.

Q510 *Lord Young of Graffham:* Would you define your conservation as part restoration?

Ms Newey: Yes, compared with other kinds of object conservation.

Q511 *Lord Young of Graffham:* So the purpose of the conservation is not only to keep the object, but to restore it to as it was first used or as it was used?

Ms Newey: No, not always. It depends.

Lord Young of Graffham: So it depends on the object.

Q512 *Lord Chorley:* It really is quite intriguing, the contrast between the Natural History Museum and the Science Museum. I get the feeling that it is probably inherent in the different nature of the collections.

Ms Newey: Yes, it is.

Q513 *Lord Chorley:* For example, with your American colleagues, would you get the same sort of contrasting picture, although they usually have more money all round anyway?

Dr Dixon: I think you have made a very useful and interesting point. Our collections facilitate basic research into real biological issues, such as the nature of evolution, what causes extinction, what causes speciation. This is quite basic biological research which our collections facilitate because they are effectively a model of life on this planet over time, so I think it is quite a different use and, when we get to look at the use of the collections by other scientists, I think you will also see a similar difference between our two institutions.

Professor Lane: I think that we do have to distinguish very much in the way in which we use our collections, but also it is a matter of definition. Even in our museum, and I am sure it is the same in the Science Museum, we struggle with the definition of what conservation science is as a distinct discipline and, therefore, in replying to your earlier questions about how much money we spend on it, I tried to avoid saying that it depends on how you define it, but that is actually what has come out of the discussion. Because of the emergence of the discipline as a discipline which is slowly coming up, and it is a much more established field in the material sciences than it is in the biological sciences, it is only in the last couple of years that we have really spent any time and effort on looking at how the different methods of preserving the specimens affect how easy it is to get DNA sequences out, for example. We are sitting on one of the largest DNA sequence libraries in the world and there are probably more DNA sequences per square metre in the Natural History Museum than there are anywhere else. The thing is that we have to get it out of the specimens and only recently have we applied much effort of a truly experimental nature which is the nature of investigative science research for me, and I think that, if you asked us these questions in 10 years' time, you would get a very, very different picture from where we are now.

Q514 Chairman: Taking on very much what you said earlier about conservation being part of the natural curatorial process, to a degree this is also true of the Science Museum, that the conservation comes in terms of curating the materials that you have got within the museum.

Ms Newey: Yes, if you define the curatorial role as actually looking after the collections in total, yes, I would agree with that.

Q515 Lord Redesdale: Just moving slightly on, how much of your collections is actually available to the public, and obviously it will be slightly different in the case of the Natural History Museum? On a slightly different slant from that, other evidence we have had shows that government priorities, priorities of DCMS, have been a lot about access in the recent past and, as some have suggested, at the expense of the collections themselves. Do you find that an issue? Obviously most of the people who are accessing your collections are going to be researchers, but do you feel that the Government's priorities are skewing your scientific base?

Dr Dixon: First of all, as you have already heard, we have about 70 million collection items and as many as nearly 20,000 of them are on public display at any one time, which, if you do the sums very quickly, is less than one third of one per cent, so it is a very small number that are visible to the public at any one time, although we do change them and of course with new exhibitions that we build we are trying to be more specimen-rich so that people see more of the collections. However, our collections are very much research collections and they are completely accessible to the research community. In fact our collection is world-renowned in terms of the level of its systematic organisation and we proudly boast that we can find any one item that somebody wants to look at within about 15 minutes. We have over the last 12 months had over 8,600 scientific visitors to the collection, spending nearly 15,000 days working with the collection, so that is a measure of the utility of the collection from an international perspective as visitors come from all over the world. Internally, by comparison, I suppose the collections get about twice as much use from our own scientists. Increasingly, we are looking to digitise collection items, both information about the individual items and, where possible, facsimiles of the items themselves, for example by scanning herbarium specimens. High-quality scans can transmit a lot of useful information, so a botanist can look on our website and look at scanned images of botanical specimens and get a great deal of information which would obviate the need to fly to London and look at the specimen itself. Indeed we are embarking on a large number of digitisation projects not just of natural history materials themselves, but actually the literature

associated with natural history from our extensive library collection of about one million volumes. We also loan specimens, so, if people cannot come to the specimen, we send it out as a loan and, as of 1 April, there were over 4,500 active loans, not necessarily specimens, as many loans are of multiple specimens. In fact I think the estimate we have come up with is that at any one time we have something like between 70,000 and 100,000 specimens out on loan, so it is a very actively used research collection.

Professor Lane: That is about 70,000 specimens a year, so, if you just take the insect collection, on any one day there are about 180,000 specimens somewhere else being looked at by researchers. The turnover is phenomenal.

Q516 Lord Chorley: But they are loaned for research purposes or for viewing purposes or both?

Professor Lane: Both. We loan both our specimens and also our art collection. You have to remember that the Natural History Museum has an art collection of 500,000 items, the third largest art collection in the UK. It is art on paper mainly, illustrations, as you might imagine, and they are frequently loaned for exhibition, although we do not loan as many specimens for exhibition because of the difficulties in actually ensuring the environment of those specimens when they are in an exhibition, and especially their security.

Q517 Chairman: In this sense, the digitisation, virtual reality and scanning is of enormous value to you, is it not?

Professor Lane: Yes, and we have been doing some experiments recently in our palaeontology department because of the difficulty of moving fossils around the world and now from objects a few microns long all the way up to quite large objects, one or two metres long, we can 3D image them and put them on the Net, where you can rotate them in three dimensions in about 30 minutes. That, I have to stress, is experimental and we have just purchased a new instrument, together with partners in two places in the US, where we are exploring a microscope that can be operated over the Internet to give access to specimens and rotate them remotely. Of course as exciting as these developments are, and we certainly think they are exciting, I would like to stress that we have 70 million items and the rate at which we can put those on the Net is limited.

Q518 Chairman: Can we put the same basic question to the Science Museum and ask what proportion of your collection is on display?

Ms Newey: We usually say that, of our 200,000 objects, we have about 10 per cent on display either in the Science Museum or on loan to other museums, the same as the Natural History Museum. I am sorry,

but I do not have the figure for the numbers that are on loan though. The rest of the collections, are 95 per cent accessible to the public, subject to time mainly to retrieve objects from the store. This is especially true in our large objects store where we have to move a lot of objects around to reach them, but we can always get things out for researchers or visitors. There are some which we have to keep on restricted access because there are hazards associated with them. We had 845 visitors last year to our Blythe House store which is our west London, small-to-medium-sized object storage, and this is in the form of specialist group visits organised by the curators and also public tours, either curator-led tours or just general tours of the stores.

Q519 Lord Redesdale: Just going back, do you feel that you have been pressured in any way over the move towards access?

Ms Newey: It is high in the museum's objectives to give access to the collections, and we do need to make sure that as many people as possible can see the collections and make use of them. We are quite happy to prepare objects for loan and tours and to make them accessible to people, but obviously it reduces the time available to work on the rest of the collection, so we are aware of that and we would like the opportunity to carry out more core work on the collections.

Dr Dixon: On access, I do not think we feel under pressure though clearly we have targets associated with our funding, but to an extent decisions on how we utilise our funding are left to our trustees and the executive staff to agree. We experiment with all sorts of ways of increasing access to the collections. We do a daily live webcast from the museum site so that more people get a look at least via the web at our collections and some explanation from our curatorial and other scientific staff. We answer scientific enquiries from members of the public and we also have behind-the-scenes tours, again limited subject to availability, so we do increasingly find ways of making more of the collection more accessible. Genuinely I think we see that as a positive thing, although sometimes we are taken aback by the amount of demand. I am in particular thinking about the famous giant squid that went on display recently and in fact public tours of the tank room with the squid were booked for literally months in advance.

Q520 Lord Chorley: Going off on a rather different tack, and I think this is mainly for the Natural History Museum, you say in paragraph 10 of your evidence, "There are very few active natural history conservators undertaking research in the UK", and, which I find quite extraordinary, you reckon that they "represent nearly half of the skilled researchers in this area in the world". Why, particularly in the

light of the discussion up to now, are there so few? I got the impression that scientific research, the science base of the Natural History Museum, is so much a part of the purpose of the museum, so why are there so few active conservation science researchers?

Professor Lane: In part it is how we define 'conservation science' and, therefore, the number of individuals whose primary role is to do investigations on methods of conservation. If we use a fairly restrictive definition, ie, people who are employed primarily as conservators as opposed to doing it as part of their curatorial job, then yes, the museum has a team in its conservation lab which amounts to half the number of people in natural history who are called 'conservators' in the UK. If we look around, and I am fortunate enough to have some information supplied by my colleague Chris Collins who runs our lab, the individuals abroad who are actually called "conservators in natural history", there is one in Leiden, one in Stockholm, three in the Canadian Museum of Nature, a particularly advanced institution, and in various universities, New Zealand one person, Los Angeles Natural History Museum one—

Q521 Lord Chorley: And Washington?

Professor Lane: Smithsonian National Museum of Natural History has two. To some extent, I think that gets back to the point made earlier that this is a discipline that is beginning to grow into an area in its own right.

Q522 Lord Chorley: Should we be getting very excited about this or just recognising it as a different fact of life?

Professor Lane: I think we should see it as a huge opportunity for a step change in how we might view conservation science. If you look at the expertise and if you look at the scientific research environment in which that is done, it is extremely variable.

Q523 Lord Chorley: The quality do you mean?

Professor Lane: Yes. If you look at all those people who have PhDs, and we tried to tot up the number. In our research environment we would regard a PhD and a minimum of three years' postdoctoral research as being the very basic requirement to get on the bottom rung of the research ladder, that is a very rare position in conservation science where it stands at the moment.

Q524 Lord Chorley: What can we do to seize the opportunity because you say it is now an opportune moment?

Professor Lane: I think that one of the clearest things to be put on the table is a way of bringing training to bear in research, in research methodology so that this subject becomes like other research areas in science.

Q525 Lord Chorley: But would that be at university level or postdoc university level?

Professor Lane: I think actually that we probably need two approaches. One is the fairly traditional postgraduate fellowships and I think also at a Masters level or even a first degree level with a very hands-on approach to research, but I think eventually, when the subject matures, and that could be ten, 15 or 20 years' time, it will take its place alongside any other part of the scientific research community and be indistinguishable from it in the kind of people who are doing it.

Q526 Lord Chorley: Is it a research council issue?

Professor Lane: I think that will be one of the most important routes for doing it, yes.

Lord Chorley: Well, that is very interesting.

Q527 Chairman: You are talking here about the emergence of conservation science as the important issue, and we have been looking at it obviously in the round and looking at conservation science in relation to pictures and in relation to both movable and immovable heritage and, broadly speaking, it seems to me that public concern about sustainability, which perhaps has been exacerbated in the last few years by awareness of climate change, is making people more aware of the need to preserve for future generations. Is this affecting this, do you think?

Professor Lane: For us in natural history, I think the social interest clearly is important and it is why the Natural History Museum is such a popular museum to come to because it is about the natural world and people wish to engage. For us using and exploiting our collection, I think it is also a technological opportunity, we can do things with our collection now that we could not do even a year ago. One very good example would be the extraction of DNA. We now know that we can get DNA out of items 100 years old. We now know from some experiments we have done only in the last six months that we can get DNA out of pieces of mosquito, and that is pretty small, on a consistent level and that 95 per cent of our specimens will generate sufficiently long DNA sequences that can actually be analysed and put up on the Internet as part of the normal way of dealing with DNA sequences. This area is moving so fast in the technology that it is allowing us to do things we could not do before, and we have already mentioned of course the imaging of specimens. If you look at some of what we did a few years ago, it is fairly primitive to what we can do now, so for us in natural history, and I would stress this, I think natural history is the embryonic part of conservation science as opposed to other areas which are much more established.

Q528 Lord Redesdale: Now you are moving towards a digitised system, of course with everything moving so quickly, can you retrieve the data that you stored 10 years ago?

Professor Lane: That is a very good question. We can because we are fortunate in that we did not do much 10 years ago.

Q529 Lord Redesdale: So you probably have to go to the Science Museum and ask for one of their exhibits!

Professor Lane: Yes, one of their card readers we can extend the use of it! You are actually quite right and we are half-way through a major project to database our collection and it is being done with a number of major institutions in the US and Australia, so we are using the same software.

Q530 Chairman: That is the same sort of issue as the British Library are tackling with digitisation.

Professor Lane: Yes, and at the front of our minds is how we curate our database system. It occupies a lot of people's time.

Q531 Chairman: Is there anything that you would like to add from the Science Museum's point of view?

Ms Newey: Certainly we can reinforce the issue about technologies changing. We have a substantial collection of early computers and early punch-card readers where we do think there may be a need to maintain those so that they can be used for the future, which is an interesting conservation problem. We recognise that the whole preservation of digital and electronic technology is something that we do have to explore for the future. In terms of sustainability, I would say that our conservation methods are changing in the way that the kind of materials we are using to preserve the objects, we are much more aware of the use of chemicals, for example, and certainly most conservation departments are changing their methods. We are also looking at much more sustainable ways of storing collections, and I am sure that other museums have mentioned this in terms of exhibition techniques as well, so we are very conscious of this whole issue in the Science Museum.

Q532 Chairman: Can I turn to a slightly different topic which I have already alluded to, this whole business of analogue status which the Natural History Museum has with the NERC. As you may or may not know, the Arts and Humanities Research Council sees itself as becoming, as they put it to us, the champion of conservation science. How far would the two museums here, the Natural History Museum and the Science Museum, view analogue status with the Arts and Humanities Research Council as being something that you would aim to attain?

Ms Newey: We have applied for it, but we have been asked to reapply in the next six months. We are very excited about this because we view it as the opportunity to apply directly for research funds because it would enable us to undertake more projects in conservation. The enhancement grants would enable us to make the collections more accessible both by a mixture of conservation and digitisation and cataloguing.

Professor Lane: We have analogue status with all the research councils, PPARC, NERC and what-have-you, and we receive competitive research grants from all of them. From NERC, for example, we have just over £1 million worth of current grants. The AHRC is interesting because, when we investigated it a little while ago, when they first opened the doors to organisations for analogue status, they unusually, we felt, asked for 10 active research academics as an entry criterion which none of the other research councils do, and we decided on that basis not to apply. I should say that we have recently been back to them and that is not a hard-and-fast rule apparently, so we shall be applying for analogue status in the near future.

Q533 Lord Young of Graffham: I think my question is really for Dr Dixon, as the Director. On the assumption that research budgets almost universally pose problems for the director, to what extent do you look outside to private funding and, if so, how do you do that?

Dr Dixon: We do a number of things. In common with all of the national museums and galleries, we undertake quite a lot of commercial activities ourselves and profits from those activities are ploughed back into our charitable objects, if you will. The museum from those sources and also from fund-raising processes for, let us say, programme activities rather than capital projects generated just under £18 million last year, so we like to think of ourselves as an organisation that is demonstrably helping itself. In terms of fund-raising, and I think that may be where your question—

Q534 Lord Young of Graffham: Fund-raising specifically looking at research and research budgets.

Dr Dixon: Obviously we apply, as Richard has said, competitively to the research councils and other organisations for projects and programme funding and we have a reasonably successful track record in that respect, in the order of £4 million a year. We also take on scientific consultancy work and broadly only where that supports research programmes and research initiatives that we wish to pursue, but that is an increasingly viable and important part of what we do. I am trying to think of some examples. We have analysed materials from the space shuttle, we are

advisers on the Crossrail project, and Professor Lane could probably reel off six or seven others.

Q535 Lord Young of Graffham: In which way do you advise on Crossrail? There are no dinosaur bones in the centre of London, are there?

Dr Dixon: No, but of course we have a mineralogy department and rocks and minerals are an important part of that project.

Professor Lane: Interestingly enough, the Australian mining industry did a review of the leading research groups in minerals in relation to mining and in ores especially and the Natural History Museum comes out as one of the world's leaders in ore research. We also advise the petroleum industry.

Q536 Lord Young of Graffham: I had always assumed that there was nothing but clay under London.

Professor Lane: Apparently not, and that is the problem.

Q537 Chairman: Just to get your £18 million into perspective, what is your total?

Dr Dixon: Our total expenditure last year was in the order of £58 million and then there is about £3.5 million of capital expenditure on top of that, so close to £62 million. Other than research grants, of course we have a fund-raising department and we try to work with trusts and foundations, with corporations and with individuals, and we have successes to various degrees of sources of funds from those groups. In the context of the work of this Select Committee, conservation science is perhaps not the easiest of topics to raise money for. We do work with corporations who have an interest perhaps in developing technologies and it is fair to say that there are at least two companies we have worked with who have supported that kind of work. There are a number of trusts and foundations that are supporting our digitisation projects and they are increasingly important to us, particularly funding pilot projects which look at feasibility studies. Indeed, there are some high net worth individuals who are prepared to sponsor pet projects. We should not lose sight of the fact that from grant funding we also apply for European funds. In fact, we are the lead partner on a large EU project called SYNTHEsys, we referred to it in our written submission. This is a €13 million project which is looking at setting European standards for natural history collections. We work very hard to generate as much money as we can ourselves.

Q538 Chairman: What is your basic DCMS grant?

Dr Dixon: Our grant in aid last year was in total £41.5 million. That includes some capital allocations.

Q539 Baroness Platt of Writtle: The Science Museum evidence notes that innovative work on the preservation of industrial and technological projects has been carried out in Canada, Australia and Germany. Is any such research being conducted in the UK, in particular at the National Museum of Science and Industry and, if not, what is needed to enable such research capacity to be developed?

Ms Newey: I think we would definitely need to have more staff available to carry out the research facility because at the moment, as I said before, we are a very small department and the majority of our time is taken up with preparing objects for exhibition loans and other access activities. We are able to take some basic research in terms of collections' care and storage and, in fact, we have done some interesting work in things like integrated pest management systems together with the Natural History Museum and other aspects which are quite low key. It is not what we recognise as the definition of conservation science but it all adds to the body of knowledge about the preservation of the heritage. We would also require funding and support from research bodies to be able to work with the conservation research sector or the groups. We do work with other museums who have conservation research facilities and they can do analysis for us but, again, it is very low key. Some of the problems are quite large and I think it would be useful to have the time and the resource to be able to explore them in a wider context. We do work with other museums with similar collections and, again, there is the need to build up the network and gain a much clearer idea of the problems across the sector. The other aspect we would like to do is to develop a much closer working with the professional bodies and the specialist groups that deal with the kinds of materials and objects that we are looking to preserve. We have recently made contact with groups like the Institute of Mechanical Engineers and the Institution of Electrical Engineers who can give us a great deal of guidance on the nature of the collections that we are trying to preserve. There is a whole network building that needs to be done as well as the input of money and skills for doing work. We have also identified training needs for people to come and work on the collections, this is something that we realise—

Q540 Baroness Platt of Writtle: The Institution could help you on that, could it not?

Ms Newey: It would be useful to persuade young engineers that the preservation of heritage is a good thing to do, and I think the Natural History Museum touched on that. Then we could attract people with engineering skills to come in and give them training in conservation theory and practice. That is the way we worked with our own in-house staff when we trained the engineering technicians in conservation and who are presently working for the museum.

Q541 Baroness Platt of Writtle: To what extent does the Science Museum provide a focus for the development of best practice in the conservation of scientific, industrial and technological artefacts around the United Kingdom? You have shown a picture of not much keenness on this and we are rather worried.

Ms Newey: We are involved in the Museums Association's subject specialist network in Science and Technology Collections that is being led by the Head of the collections unit—we are part of the collections unit in the museum. The conservation staff run training courses for other conservators, for example, the conservation manager at Wroughton ran two training courses in the care of large industrial objects for museums. I have been involved in organising and delivering training courses on the conservation of ship models for mid-career Conservators so that they can gain an understanding of the problems involved in treating unfamiliar types of objects. We see ourselves very much as being able to offer training for others. We also take students from the object training courses for work experience as part of their training so that they can gain experience in our types of material. We will also deliver seminars on conservation practice.

Chairman: I fear I must wind up the session because we have got some further evidence that we are going to be taking.

Q542 Baroness Platt of Writtle: Can I ask a question because I had contradictory evidence as to whether the Brighton Engineerium has closed.

Ms Newey: It has closed.

Q543 Baroness Platt of Writtle: I read in the *Scientific Press* that there had been a last minute bid and it had been kept open.

Ms Newey: Not as far as I know.

Q544 Baroness Platt of Writtle: Could you find out for us?

Ms Newey: I understood it had closed. I presume that you are also thinking about the course they were intending to run with the university?

Q545 Baroness Platt of Writtle: No, I am thinking of the collection. It is a very valuable collection which must have a connection with the Science Museum.

Ms Newey: I understood that was sold recently.

Q546 Baroness Platt of Writtle: This is what I am asking, is it going to remain open?

Ms Newey: No, I do not think it is. I will find out for you.

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Dr Michael Dixon, Professor Richard Lane and Ms Hazel Newey

Q547 Chairman: One of the issues that certainly came through in the evidence that we received is concern about the conservation of the collections of science and technological objects and I think it is extremely important. I must wind this session up and in doing so I would like to thank you very much indeed for coming along, I think it has been a very useful session for us. Thank you for making the effort to come and give evidence to us. We have not touched on the final subject which was really about collaboration and I would urge you perhaps to put your answer to that in writing because we would like to hear about that.

Dr Dixon: We would be very happy to do that.

Chairman: If there are any other issues you would like to raise with us, please do so. We shall be working on the report during the course of the next month so anything that you would like to submit would be looked at and taken into account but do so as quickly as you can if possible.

Q548 Lord Paul: Do you think the Science Museum needs more importance on the issue of some rights rather than being treated as a step child?

Ms Newey: Do we think it is more important?

Q549 Lord Paul: That there is not enough importance on this, yes. Put it in writing, please.

Ms Newey: Yes. How long have you got?

Q550 Chairman: I tried to persuade Lord Sainsbury that we should have the Battersea Power Station at the other end of our Museum for Science and Technology. In itself it is an icon to 1930s technology but, sadly, I am afraid that I was not able to persuade him.

Dr Dixon: Can I take this opportunity to thank you all.

Ms Newey: Thank you.

Supplementary Memorandum by the Natural History Museum

Question: The written evidence from the NHM notes that “strategically many museums do not tie together their virtual and physical offering—they are treated as different spheres with little overlap”. What are both the NHM and the Science Museum doing to overcome this problem? To what extent are you collaborating with other institutions or the private sector?

Response to final question:

We are approaching the tie-in between the physical and virtual offer both in a strategic manner and through the implementation of pilots and subsequent evaluation.

In 2004, the Museum agreed the Interactive Media Strategy to develop and improve the relationship within physical and virtual space: “Interactive Media will engage the visitor both virtually and in the galleries. Through creating inspiring material and interactive tools both on the Web and in the galleries, a virtuous circle will be created between the virtual and physical space, extending the visitors’ interest and relationship with the Museum.”

We have worked to develop the supporting infrastructure such as gallery interactive media and web teams which combine to develop a common skill set that can work across physical and virtual exhibitions.

We have also strived to ensure that the tie-in between the two is considered at an early stage and the Interactive Media team is embedded in development of projects, this is vital to ensuring a continuous visitor journey between the physical and virtual space.

An example of this work includes the ‘call to action’ ecology kiosk which is situated in the Ecology gallery. The kiosk allows visitors to bookmark both information and organisations they feel are relevant and also to have links to both the NHM website and other organisations’ websites sent to them at home for further investigation.

We also offer a multimedia tour via a handheld computer that uses video, image and text to tell the story of the Museum and its architecture and research. Each point can be bookmarked and after finishing the tour an e-mail is sent to the user with specific links to the Museum website which gives other information.

A kiosk within last year’s Wildlife Photographer of the Year exhibition enabled visitors to browse any of the photographs on display then bookmark their selection and send it to their home address. An e-mail was then sent to them with thumbnails of the pictures that linked back directly to the Museum website gallery. Visitors could then follow up at home to obtain further information.

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This year we are collaborating on a pilot scheme working with Oxford Brookes University, The Woodland Trust, The Field Studies Council and Pond Conservation to provide school children with small hand held computers to help identify plants and small animals. At the Museum this would involve identifying woodlice and ladybirds in our wildlife garden.

CONCLUDING STATEMENT

Our research culture and the quality of our science supports the Museum's authority and credibility as a world-leading natural history museum. The Museum's collections underpin everything that we do and its conservation is of great importance.

Although a government sponsored national institution we are international both in the scope of our research and in the range and scale of our collections and those who make use of them—our visiting scientists come from around the world. While we can be very positive about the protection and utilisation of our collections, the fact remains that only approximately 40 percent of our collections are in the correct environmental storage conditions.

Maintaining current levels of funding is crucial to ensure that environmental conditions are improved within a manageable timeframe without long-term risk to the collections. The Natural History Museum is an organisation that is actively seeking to generate our own funds to reinvest in what we do. For example, based on current levels of funding, last year the Museum was able to generate additional funds of £4.75 million to support our scientific activities.

Capital developments such as the Darwin Centre Phase Two project, scheduled for completion in 2009, will address part of the collection storage and maintenance issues for the present day. However, new techniques and fields of study, such as the recent rapid advances in the extraction and molecular analysis of DNA, will inevitably emerge which may affect conservation needs.

We agree in principle with the research councils providing the support for conservation research funding. However, if the AHRC is going to lead on conservation research funding for natural history collections then their expertise needs to be informed by that within other research councils, such as BBSRC, EPSRC and MRC, as this is not just a materials science issue. There are also likely to be common interests ranging from biological to pathological applications in medical science where DNA needs to be extracted from a preserved specimen.

Supplementary Evidence by the National Museum of Science & Industry (NMSI)

OVERVIEW OF NMSI

Each year over 15 million people visit NMSI Museums and their websites. NMSI's world-class collections range across science, engineering, technology, medicine, railways, photography, film and television. The family members are the Science Museum in London, the National Railway Museum in York, the National Museum of Photography, Film & Television in Bradford and Locomotion in Shildon, County Durham.

In addition to the main galleries in South Kensington, the Science Museum also owns a 545 acre site outside Swindon where it houses large objects from NMSI's collections. The site can be visited on organised tours and there are plans to significantly increase access to the collections here over the next 5-10 years. The Museum also occupies space in Blythe House, Olympia where it stores c190,000 small to medium sized objects from the collections. There are conservation staff and facilities at all three sites with trained staff preserving the collections and preparing them for display and interpretation.

As well as their unrivalled collections, NMSI museums have a world class reputation for their science communication and interpretation skills. They have successfully developed innovative teaching methods including interactive, hands-on programming, live events, the use of real objects, interactive multi-media and dialogue/debate formats on hot issues in contemporary science. Rigorous training and evaluation mean all NMSI's educational programmes and exhibits are of high quality. The Science Museum alone receives 270,000 children a year on organised school visits—more than any other UK museum.

The museums also run a number of very successful school and community outreach projects which have enabled them to gain a high level of expertise in delivering hands-on science programming to hard-to-reach audiences.

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Within the overall structure of NMSI, the role of its conservation department is to underpin the group's excellence in the care and interpretation (through innovative education and engagement as described above) of its world class collections.

ADDITIONAL INFORMATION TO COMMITTEE QUESTIONS

1. *What are the particular challenges affecting the conservation of industrial, scientific and technological collections?*

The preservation of scientific, industrial and medical collections is a relatively new specialist area for the conservation profession, which had its origins in fine or applied art and archaeological object conservation. The challenges arise from the following:

- Diversity of materials used in manufacture and construction—objects which are mainly composite in nature ie made from a mixture of materials;
- The need to understand the nature of the objects in order to preserve them eg How are they made? What were they used for? etc. They may have complex structures with a minimal amount of information existing about their use or history;
- Many are made from materials which are inherently hazardous eg radioactive, toxic, flammable etc. and so present particular handling and storage challenges;
- Many objects are large, heavy and complex and some are even immovable;
- The objects frequently require detailed interpretation for museum visitors to understand what they do and how they function. Conservation has a role, in assisting the interpretation of the objects by careful cleaning, stabilisation and reconstruction. However with many artefacts they may need to be physically demonstrated or shown working, in order for their meaning to be clear. This has the potential to irretrievably damage the artefact leading to loss of important historic and cultural evidence if carried out carelessly. Traditionally, the conservation profession has been against the use or operation of historic objects but this is one area where research can play an important role in bringing together preservation and interpretation;
- The practical skills required to work on historic objects include metalworking and engineering techniques which are now rarely taught because modern industry has little or no longer need for them. There has been a suggestion from bodies involved with the preservation of the industrial heritage that conservation should preserve both artefacts and the practical skills (known as “dying” skills) needed to carry out the work. There are close parallels with the conservation of historic buildings so that damaged or incomplete items can be repaired, and the processes documented properly as part of the history of the object;
- Finally, within contemporary science (20th and 21st century) collections many objects tend to be “black box technology”—that is the external appearance of the object gives little or no clue about its use. The preservation of the internal contents requires other skills such as electronic engineering. The materials themselves are problematic in that they break down within a few years and cannot be chemically stabilised or repaired like wood, metal or ceramics.

2. *Where does conservation science figure, in particular with regard to the conservation of museum collections, within your organisation's strategic priorities? What funding is allocated to conservation science in particular and the conservation of collections more generally?*

- Conservation science is an integral part of the wider area of conservation research. It is concerned directly with the scientific study of the deterioration and treatment of materials used in the manufacture and the preservation of the cultural heritage, including the environment in which the objects are found or placed;
- The Conservation Section at the Science Museum originally included a science research unit. This was not successful as only one of the three posts in the unit was filled and the person in post found it difficult being on his own, even though he had working contacts with other museum—scientists do not work well in isolation;

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- A recent review of research was undertaken by the Head of Research and Residencies in the Collections Unit at the Science Museum. He identified conservation research as one of the three core areas the museum should be developing, alongside visitor learning and curatorial research into the collections;
- NMSI Conservation budgets:
 - (i) Combined NMSI conservation budget 2006–07
 - Staff—£762,600
 - Operating—£184,100
 - Total—£946,700
 - (ii) Science Museum conservation budget 2006–07
 - Staff—£487,000
 - Operating—£91,400
 - Total—£578,400
- It is one of the roles of the Science Museum's Head of Research and Residencies to find additional grants for research and this is currently under development. The Conservation Section also works with other fundraisers in the museum to explore different sources of funding for work. For example the work currently funded by Renault to investigate the structure of one of their early vehicle engines in the collections.

3. *What proportion of your collections is either on display, or accessible to users including researchers? How heavily are the collections used by researchers?*

- Approximately 10 per cent of all NMSI's collections are on display;
- 95 per cent of the Science Museum's collections are accessible—subject to time to retrieve objects from store. Approximately 1,000 objects are on loan to 122 other institutions throughout the world. The remaining items are not available due to restricted access for certain types of objects;
- 851 visitors to Blythe House during 2005–06 on specialist groups, tours etc;
- Science Museum/Blythe House receive 10–12 researchers a year, about half of which spend more than one day studying our collections. Three Ph.D. students are linked to the museum and carry out research on our collections. We are seeking to increase the number of researchers using our collections by increasing our links with higher education institutions, reaching out to graduate students working in the history of science, technology and medicine and material culture, and by developing a popular history outreach programme;
- The Science Museum in Wroughton outside Swindon received 47,538 visitors during 2005–06. The Museum is currently looking at developing this site and moving the collections housed at Blythe House there. Plans for a new conservation facility have been drawn up with a view to increasing the research potential of the Conservation Section;
- 85 per cent of NRM's collections are accessible. 2,000 objects are out on loan including operational vehicles to historic railway societies.

4. *What benefits has analogue status with NERC had for the Natural History Museum? How would NHM and the Science Museum view analogue status with the Arts and Humanities Research Council, which is championing conservation science research?*

NMSI has already applied for AHRC analogue status and is currently waiting to see if it has been successful. Such status would enable us to apply for research funds for conservation and conservation science projects. In addition we could apply for resource enhancement grants which would make our collections more accessible to the public, and which could for example include the conservation of objects which are then made available to the public via the internet.

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5. *The Science Museum evidence notes that “innovative work on the preservation of industrial and technological collections is being carried out in Canada, Australia and Germany.” Is any such research being conducted in UK, in particular at the National Museum of Science and Industry? If not, what is needed to enable such research capacity to be developed?*

- Canada, Australia and Germany have carried out work on the preservation of large scale industrial sites—for example in Germany they have tackled complete factories and blast furnaces. This type of work is being carried out by English Heritage in England together with a very small number of private companies. For example—the winner of the 2005 Award for Conservation (funded by Sir Paul McCartney) was the preservation of a mine in the Lake District. The Science Museum was professional advisor for one of the funding bodies;
- Research within the moveable scientific heritage is mainly devoted to collections care and storage rather than treatment of objects. Where possible research is linked with other projects in other museums involving similar materials or object types;
- The challenges for conservation are the quantity and size of objects to be preserved: the treatments require “industrial” materials and techniques—this may not always fit within conservation principles but there is a need to use both. As said earlier many objects are required to operate in order to assist interpretation. Industrial and scientific objects are often in private hands and preserved by engineers without a conservation background with the emphasis on restoration, leading to loss of historic evidence;
- The Science Museum has a very small conservation department and does not have analytical facilities in-house. We rely on working with other museums or universities on specific projects. We have sponsored 4 PhD posts in the past—two in plastics, two in conservation of aluminium;
- The museum is planning an exhibition in 2007 on the History of Plastics to celebrate the centenary of the first plastics. As part of this we are hoping to include a small display on the work we are carrying out on the storage and care of plastics as these are a major problem for the future.

Science Museum/NMSI Needs:

- Conservation facilities at all our sites with trained staff who can cover the range of materials found in the collections. As mentioned above, plans for developing our Wroughton site outside Swindon (large objects store) include upgraded conservation facilities;
- Increased access to analytical facilities and conservation scientists who have relevant expertise who can assist us interpret the results. There have been suggestions from other museums for regional laboratories—it is important that the research facilities are linked with museum collections so that the conservation scientists understand the needs of preserving historic collections. At the moment we rely on support from those museums who have analytical facilities or university departments;
- Build on the current network of museums that hold similar collections so research projects are planned strategically and results can be shared. The Science Museum is already acting as a hub for one of the Subject Specialist Networks.

6. *The written evidence from the NHM notes that “strategically many museums do not tie together their virtual and physical offering—they are treated as different spheres with little overlap”. What are both the NHM and the Science Museum doing to overcome this problem? To what extent are you collaborating with other institutions or the private sector?*

- We have a programme of constructing major websites in association with exhibitions.
 - (i) For example: “Ingenious”: puts our collections in context and its style fits in with a programme of temporary exhibitions which bring out otherwise hidden collections, also branded “Ingenious” www.ingenious.org.uk (Nearly 700,000 visits in 2005–06);
 - (ii) “Making the Modern World” has a website which was awarded the best of the web award at the Museums and the Web conference in 2005 www.makingthemodernworld.org.uk;
 - (iii) The proposed “Making of Modern Science” gallery will also have an associated major website;
 - (iv) NMSI websites currently receive nearly 13 million visits a year.

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- The connection between real and virtual forms a key strand in our forward strategy. The technologies trialled in the Science Museum's Dana Centre (webcasting, real-time user feedback, voting/discussion), which cross the real/virtual divide, are now being rolled out across all online products. For the new Science Museum website, for example, we will be employing innovative tools which will allow users to comment about their visit to the museum and the galleries and objects they have seen. In the other direction: we have had great success with allowing users to the physical museum to email themselves electronic bookmarks—for the Energy InfoZone, we average 70 of these emails every day;
- We are constantly exploring the possibilities of collaboration both with other cultural institutions and with the private sector. The Making the Modern World site was constructed with funds from the Invest to Save initiative in partnership with a private sector IT company, MWR Ltd, and a school, Peter Symonds College. The next digitisation project, "In Sickness and Health", is being undertaken with Wellcome Trust and uses objects from the Wellcome Collections of the history of medicine that are in our collections.

Other collaborations:

- Training institutions for conservation and collections management: The Science Museum conservation section has taken in students and interns from UCL (Institute of Archaeology), University of Lincoln, West Dean College, City and Guilds, Technical University of Berlin. Head of Conservation is a programme advisor for West Dean College, metal work course. Staff have delivered lectures and seminars for training courses and local museum groups as well as organising and participating in Continuing Professional Development courses for mid-career conservators.(conservation of ship models at West Dean College);
- Enthusiast groups: the Science Museum has been closely involved with Computer Conservation Society since 1990s and the society is presently restoring two of the historic computers in the collections. This is undertaken alongside the curators and conservators in order to gain detailed knowledge and understanding about the objects from the specialists;
- Professional bodies: the Science Museum has recently approached the chartered engineering institutes in order to advise on developing the collections and in particular contemporary objects to be acquired. At the same time the member can also provide the conservators with useful information on contemporary materials and manufacturing methods to assist with the objects preservation.

Memorandum by the National Trust

INTRODUCTION

1. The National Trust welcomes the opportunity to contribute to the House of Lords Science and Technology Sub-Committee Inquiry into Science and Heritage. The National Trust's portfolio includes all the elements of cultural heritage that are the subject of this inquiry, including buildings, works of fine and decorative art, books, manuscripts and records in our libraries, and archaeological relics both in the form of objects and sites.
2. The National Trust's approach to conserving these assets is a dynamic, not static activity. We define conservation as the careful management of change. It is about revealing and sharing the significance of places and ensuring that their special qualities are protected, enhanced, understood and enjoyed by present and future generations. The understanding of significance is often informed by scientific investigation, and therefore the National Trust believes that science is intimately connected with the conservation of the nation's cultural heritage.
3. Discussions about the subject of this inquiry have been taking place between representatives of a number of heritage, museum, library and archive organisations including the National Trust, English Heritage, Historic Royal Palaces, National Archives, British Library, British Museum, Victoria and Albert Museum and the National Museum of Science and Industry. This response sets out the evidence from the National Trust, but is also informed by the discussions with our sister organisations.

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KEY POINTS AND RECOMMENDATIONS

4. Our key points and recommendations are:

- End user-led research should become the norm. The research agenda should be influenced as much by end-users as by academic institutions. Partnerships should be promoted—the National Trust sees its major contribution to be in kind, in the services of staff, the provision of data and test sites, in the form of original and often well-documented sites and objects, for research. It sees areas of research interest being not only large multi-stakeholder projects, but also smaller projects for Bachelors, Masters and PhD candidates;
- A clearing house should be established to liaise between end users and researchers on both the UK and international stage;
- More conservation literature should be recognised by the Research Quality Assessment by ensuring that it is peer-reviewed to appropriate scientific standards;
- Funding should be made more readily available to end-users, without being so dependent on EU and national research council grants:
 - to develop conservation science technology;
 - to fund equipment and analytical centres;
 - to provide salaries for conservation scientists, in both development and analysis;
- Funded training courses and internships for conservation scientists including analysts, should be established, to grow the pool of freelance providers and of potential successors for staff posts;
- The training of employed conservators, archaeologists and building technicians/ surveyors/ architects in conservation science should be improved;
- Analytical facilities, both within academic institutions and commercially, should be more widely available;
- There should be a greater recognition and appreciation of the history of science, engineering and technology as part of the nation's cultural heritage. This can be achieved through improved interpretation of sites linked with science, scientists and industrial archaeology.

PRIORITY AREAS FOR RESEARCH:

5. Collections:

- Vibration monitoring/visitor wear and tear on historic surfaces and building structures;
- Preventive conservation including environmental monitoring and control;
- Holistic approach that takes account of the object or structure and its setting/location;
- The economics of conservation, at present limited to an understanding of the management of dust and housekeeping;

Archaeological sites and collections:

- Better understanding of the conservation of archaeological relics left in situ;

Historic buildings:

- Impacts of climate change, particularly relating to increased extreme weather events;
- Understanding of role of traditional methods and materials in building conservation;
- Development of sustainable building conservation techniques, for example, increasing energy efficiency in existing buildings;

Overarching:

- Risk assessment and risk management.

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THE ROLE OF THE NATIONAL TRUST

6. The National Trust is Europe's largest conservation body with over 3.3 million members, 43,000 volunteers, an annual turnover of more than £300 million and a presence throughout England, Wales and Northern Ireland. We currently protect and manage on behalf of the nation over 600,000 acres of countryside and 600 miles of coastline together with a significant proportion of the country's designated sites and buildings of heritage significance. This includes 6 World Heritage Sites, over 6,000 listed buildings, 1,200 scheduled ancient monuments, 149 registered museums and 8 per cent of registered historic parks and gardens.

7. Our property portfolio is hugely diverse ranging from some of the nation's most iconic and well-known sites—from Sutton Hoo to the great country houses of Hardwick Hall or Kingston Lacy. We also care for many of the more ordinary and everyday elements of our rich and diverse cultural heritage. This includes places like the Back to Backs in central Birmingham, the Workhouse in Southwell, Nottinghamshire, over 1,000 vernacular buildings, 3 lighthouses, a gold mine and the national lawn mower collection. As well as our houses, we look after an amazing collection of gardens and historic landscapes, like Stourhead and Sissinghurst, have fantastic works of art, from Titian to Turner, and a rich and diverse industrial archaeology, like the Stone Age Axe factories in the Lake District.

8. Many of our properties have strong scientific and engineering connections through their former owners. Sir Isaac Newton was born and lived at 17th century Woolsthorpe Manor. His life and scientific works are celebrated in the Interactive Science Discovery Centre and visitors can see a descendant of the apple tree that inspired Newton to discover gravity. Some houses have significant collections of scientific instruments, including Dunham Massey with rare examples of an 18th century orrery and telescope. Cragside, the first house to be lit by hydro-electricity was built by Victorian engineer and inventor, Lord Armstrong. Castle Drogo, designed by Sir Edwin Lutyens in the 1920s, was also powered by hydro-electricity from two turbines on the nearby River Teign. Country house technology is represented by gas, electric and hydraulic installations within or directly connected to historic houses.³

9. The work of conservation of cultural heritage is informed by a staff of approximately 200 historic properties specialists who advise property staff. The disciplines responsible include archaeology, building conservation, collections conservation and curatorship, fire precautions and emergency procedures and security. There is also a large gardening staff, although their work does not come under the scrutiny of this Sub-Committee. Although many of the staff have scientific or engineering qualifications, none are employed as conservation scientists. For this the National Trust relies on consultants, universities, conservation scientists working in museums, galleries and libraries, and anyone else who can help with our investigative and conservation research work.

CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

10. Through informal networks: made at conferences and professional meetings; through invitations to teach and become members of boards of studies; catalysed by publication of research and news in the (relatively few) conservation publications. Some projects also cultivate new networks and use existing ones to research new areas.

11. We feel that stakeholder or end user-led research should become the norm. The research agenda should be influenced as much by end-users as by academic institutions. Partnerships should be promoted—the National Trust sees its major contribution to be in kind, in the services of staff, the provision of data and test sites, in the form of original and often well-documented sites and objects, for research. We see areas of research interest being not only large multi-stakeholder projects, but also smaller projects for Bachelors, Masters and PhD candidates.

12. It would be useful if there were a clearing house that could liaise between end-users and researchers on both the UK and international stages.

³ See *Views Issue 39 Winter 2003*, feature on Science and Technology; NT Policy Paper on Industrial Heritage—the role of the National Trust; and chapters on Scientific Instruments and Historic House Technology in *The National Trust Manual of Housekeeping*, submitted as part of our evidence and 1996 NT members AGM resolution on properties of scientific, engineering and technological interest and list of relevant properties.

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13. It can be difficult to gain access to articles in languages other than English. Much conservation literature is not part of the citation index nor is it recognised in the Research Quality Assessment, resulting in university researchers sometimes being reluctant to publish in conservation publications. Better recognition of the validity of peer-reviewed conservation science literature would provide more incentives for universities to work in partnership with museums and other heritage organisations.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

14. Conservation research in the National Trust is funded through our participation in EU or national research council grant-aided projects, and through charities such as the Leverhulme Trust. Some internally funded projects address specific National Trust needs (for example, materials analysis supporting the conservation of individual objects, surfaces or structures). Conservation research is also supported by staff, who carry out small research projects themselves and also fund some of this out of operational budgets. They direct research activity to the areas that the NT needs.

15. However, it is difficult to get funding for conservation science research projects, which need an academic partner and sometimes two or three applications are needed for success, which is a heavy drain on the time of non-research staff (of which NT staff is largely composed) and a long postponement for the issues with which we grapple.

16. There is a feeling that the research agenda is driven more by universities, which have the capacity to make the complex applications required by EU and the research councils. Consequently some issues that we as an end-user would like to see addressed, like the assessment of new treatment materials, are neglected as the focus of academic institutions has moved away from intervention. However, through judicious networking the Trust has been able to identify the researchers interested in the areas we wish to pursue.

17. Recommendations for direction of conservation research are listed in paragraph 5 above.

18. In terms of the skills base, the relatively low pay offered to conservation scientists (presumably the skills referred to here) is not competitive in the face of offers from industry, abroad, and from the financial markets. Consequently there is not a large pool of conservation scientists from whom to draw, either providing freelance services, especially as analysts, or as successors to staff positions. Funded training courses and internships for conservation scientists, including analysts, should be established to increase the number of freelance providers and potential successors for staff posts. Furthermore, the training of employed conservators, archaeologists and building technicians/surveyors/architects in conservation science should be encouraged.

19. The equipment that freelance or employed conservation scientists need is not readily available. In some specialisms there is provider of only one or two people (analysis of organic materials, for example) so significant delays can build up. Analytical equipment should be made more widely available, both within academic institutions and commercially.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

20. We lag behind other countries—we borrow their cutting-edge science and technology, and it has to evolve (and therefore become no longer cutting edge) to become practical and affordable in order to be applied to monitor condition and aid treatment. This means that we have developed low tech and low cost solutions for our monitoring and treatment needs. In a Calvinistic sense this may be no bad thing, though who knows what opportunities and solutions have been missed.

Is there a satisfactory process to develop practical applications of conservation research for the market?

21. Again, the process is ad hoc, as development for the market inevitably means patents and funding prototypes. The cost of the patenting process means it is beyond the resources of most organisations save institutions set up to develop new initiatives, which includes having a development office and lawyers. Where we have developed monitoring devices, it has proved difficult to continue to benefit from our development once the device is manufactured and sold by a third party, as they need to make only the smallest changes to be able to argue that it is completely new.

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Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

22. Such a question inevitably begs the answer yes. However, conservation science should be a means to an end, by being focused on interpreting collections and buildings (including both fine art and architecture, as well as technological and scientific sites such as industrial archaeology), or the stories of the people who figure in the history of science and technology, rather than as an end in itself. The Trust uses conservation science as part of interpretation of conservation projects to the public, and to participate in the national curriculum and in “science weeks” (Pest Detective, Country House Technology) but this may be an aspect of the overall issue of how well conservation is interpreted to the public, which again needs improvement.

23. Examples of National Trust sites with scientific, engineering and technology connections have been given in paragraph 7 above, and public engagement is provided through a number of different interpretative media.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

24. IT has great potential as an alternative means of interpreting cultural heritage. To name but one technique, digital audio guides have revolutionised the layering of information to suit the various audiences who visit heritage sites. Now that this technology can be delivered via mobile telephone, the affordability is open to a wider range of heritage sites. However, it is important to remember that the IT is a means to an end, and the quality of information provided is far more important than the method by which it is delivered.

25. IT can contribute to conservation by providing virtual access and thus saving on wear and tear, and loss of aesthetic and evidential value. The ways of doing so change as fast as IT changes. Thus, it is equally important that investment into the latest, and sometimes ephemeral hardware and software, does not take money away from essential maintenance and backlog conservation.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

26. Providing IT preserves the “spirit of place” there is scope for improvement, for example, providing information through mobile phones rather than banks of computers in a newly built visitor centre. However, it must be recognised that IT needs proper funding for maintenance and refreshment and can become another liability.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

27. Digitising information for internet access, such as the on-line catalogues of the NPG and Tate collections, and soon to be launched National Trust Historic Properties on-line digital photographic archive. Also the technology that enables fragile objects to be handled virtually, eg the “turning the page” exhibitions at the BL. As one-offs, there are CDs of information and virtual tours of some National Trust houses, which enable far more information to be provided to visitors, to be browsed at their leisure and for reference, than would be available at the same price in books. These virtual tours also provide an alternative form of access for physically disabled visitors where the National Trust is unable to provide access to upstairs and other inaccessible parts of properties. Once the information has been digitised, the media on which it is provided can be readily updated, rather than making the technology dependent on new hardware.

Examination of Witnesses

Witnesses: Ms SARAH STANIFORTH, Historic Properties Director, Ms KATIE LITHGOW, Senior Conservator, National Trust; and PROFESSOR JACQUES HEYMAN, examined.

Q551 Chairman: Welcome. I apologise for being a little late on this. We envisage that we will probably wind up somewhere around one o'clock but we may run over a little bit. Can I also say thank you very much indeed for coming. We have already talked quite a lot about the National Trust because not only

did Sarah Staniforth come and give evidence or participate in our initial seminar but we also had a very good visit to Blickling Hall and thank you very much for arranging that, I think it was extremely useful. Can I take up something which you said in your written evidence. You argued that “end-user led

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research should be the norm in the field of conservation science". I wonder if you could clarify this a little bit, what precisely do you mean by that?

Ms Staniforth: Yes. I will answer first and then ask Katie Lithgow to give an example of the type of end-user led research that we mean. Conservation science is an applied science and we believe that the subject of research of applied science needs to be informed by the users of that research and that end-users, as far as heritage is concerned, like the National Trust, the museums and English Heritage, whom you have also heard evidence from, are the people who can identify the problems that require solutions. We found that in practice provided that we can make the researchers aware of the subjects that require investigation and that we can then subsequently be involved at an early stage to help formulate the nature of the research project, that results in projects that find solutions to real problems in the real world.

Ms Lithgow: The example which I was going to give you was the research that we have been doing on dust, which in conservation science speak may be known as "particulate pollution" but in terms of housekeeping and preventative conservation strategies we are quite happy to call "dust" because that is what our property staff recognise it as. The project came about largely through conversations between our staff and scientists who work in the arena of conservation at conferences and there arose a link between the world of atmospheric pollution and the world of historic houses and led to a collaborative project which was funded by the Leverhulme Foundation along with partners in the form of Historic Royal Palaces, English Heritage and UEA. That was a good example of external funding plus university collaboration to which we offered the sites and the experience of our own professional staff. It has been an extraordinarily useful study in, I hesitate to say, glamorising what might seem to be a fairly run-of-the-mill thing but it is something that we spend an awful lot of time working with in the National Trust as it is something which an awful lot of our visitors produce. It has not only involved hard science in understanding the nature of this particulate pollution, where the main source of it is and therefore where we should be focusing our activities, but has also given us a lot of steers towards the strategic operation of our properties and the best way of managing visitors and visitor routes. I think it has been a good way of showing how user led research can advance the boundaries and in ways that also heated the imagination of the museum world. We often draw contrasts between our collections being shown on open display in houses whereas museums show their collections in display cases and increasingly those boundaries do not happen and there is a much greater understanding and sharing of our interests which I think is a good sign for

collaboration in the future so the historic house world and the museum world are not so different.

Q552 Chairman: You were also saying that you feel the research agenda should be influenced as much by end-users as by academic institutions. Do you think this is achievable in practice?

Ms Staniforth: I think that there are tensions between the end users and the universities and that is because there are academic needs of the students and we work with BSc students, with MSc students, with PhD and with post-doc and as you get higher up the academic hierarchy the research can be more tuned to the needs of the end user. We find the greatest tension with the first degrees where students are inexperienced researchers where they have to tick certain academic boxes in order to be able to write their dissertations and, therefore, their research very often follows their own academic needs rather than the needs of the end-user.

Q553 Chairman: Professor Heyman, I do not know whether you have any views on this particular issue?

Professor Heyman: I agree with what has been said. Particularly from the field of masonry, the end-users are churches and cathedrals and they do not have any money, so to speak. They at least suggest problems and hope to find other sponsors. There are exceptions to this. For example, a very large class of masonry structures are the Victorian brick viaducts for the railways, which are 100 years old or more and in need of restoration. There, there are users with commercial interests and there is an association of users who actively encourage research and sponsor research and so on, so there is a user directed operation going there.

Chairman: It is interesting to hear that.

Q554 Lord Young of Graffham: Can I come on to this tension perhaps between the priorities of university-based researchers and those who care for and conserve our existing buildings. Universities have been increasingly dominated by RAE, research and assessment exercise, hopefully that may not continue for too long, but at the end of the day it is ticking boxes, it is marking up how many papers. The work that you do in looking after, should that also result in an assessment of papers that are published and, if so, is the quality of that work of a similar standard to the quality of the university network?

Ms Lithgow: We believe the sort of work that we do would meet the RAE standards. The difficulty is that the conservation journals which most of the work is published in are RAE accredited so, consequently, researchers often have to publish to two ordinances—

Q555 Lord Young of Graffham: One in English.

Ms Lithgow: And one in science speak, yes. That may lead to a constriction in the amount of work that gets published and also the accessibility of it to the end user in terms of how the person who is working on the ground can get access to those journals. I think there is also an aspect where university researchers need very novel and publishable material to work with, that their priorities might not match the priorities that Conservators have for their collections so the sorts of issues that they want to research, in fact, might be one of our lowest types of agents of deterioration.

Q556 Chairman: I think many witnesses have argued that conservation science research papers published in conservation journals should be better recognised in the RAE. Are you confident that the research emanating from museum or gallery-based scientists is of sufficient quality to merit such recognition?

Ms Lithgow: It is heavily peer reviewed and, indeed, the panels which study, for instance, studies in conservation have an element of conservation scientists as well as university academics, so the notion of having peer review before publishing anything is very well accepted in the conservation literature.

Q557 Lord Paul: Professor Heyman, as an engineer your career has fascinated me from a university-based career and then getting into cathedral restoration. I have seen a lot of engineers who go into all sorts of professions but you are the first one in this. How did you become involved in it?

Professor Heyman: I will only take a minute or two. I did my original research work in steel structures under Lord Baker of Cambridge University who developed the so-called plastic theory for the design of steel structures and I spent four or five years in industry, became a chartered engineer and designed steel structures and so on. About 40 years ago I realised that the very powerful new theorems that we had developed in the so-called plastic theory were new and gave one a totally new insight into how to look at steel, were, in fact, universal and they could be translated into other materials, concrete for example. In particular, I did a little translation job into masonry and published in a peer review journal, a rather eminent journal which, surprisingly, was read by an architect outlining how one could look at, for example, a cathedral in terms of these new ideas and this architect came to me and said, "I have got a cathedral, it is cracked, you know all about masonry, come and help me, please". I knew nothing at all about masonry, I had done a little bit of mathematics and translated these theorems into stone. I started learning 40 years ago from this architect on a practical job, it was Ely Cathedral, a massive

restoration of the great west tower. I learned from the architect, from the contractors who were engaged in it, the people who had traditionally been doing the jobs, and I tried to absorb all this information and put it in terms which I understood as an engineer. I am afraid this casual acquaintance took me over completely, I became obsessed with the idea of restoration and for the next 40 years I started writing scientific papers and also was very much engaged in the restoration of cathedrals, churches and so on.

Q558 Lord Paul: We are delighted that you did that. Did you experience any tension between your academic role and your work with the Cathedral Architects' Association?

Professor Heyman: No, not at all. The Cathedral Architects' Association is a guild, to be polite, of the 60 architects in the country who look after cathedrals, where they exchange information, and I am a corresponding member so that I can also talk to them there. These cathedral architects, and I am not being patronising here, are fully competent to deal with most problems that arise in masonry restoration but every so often they feel that they do need their hands held. For example, if they have to take down a flying buttress, they would like to know how much force is going through that flying buttress so they can put props in it to take that force. That is very elementary advice for a simple problem, but that sort of problem does involve an engineer, so I got involved, as I say, in a number of these.

Q559 Lord Redesdale: Just to use the example of dust, it seems that many of the collaborations you are talking about between universities and end-users seem to be slightly haphazard, somebody comes up with a problem and somebody happens to be working in the field. Is that the case or is there something guiding you at the moment?

Ms Staniforth: I think that is very fair. We sometimes use the word "serendipitous" as well. At present our collaboration with universities very much comes through networking at conferences, both national and international because this type of research goes across the borders of countries because there are exactly the same issues about a need for conservation science research throughout the world. Our main mechanisms have been through conferences, through publications and teaching opportunities as well.

Q560 Lord Redesdale: Would you see the new research council, the AHRC, acting as a guide in areas of collaboration or do you think that is an area that is too wide or too varied to be regulated in that way?

Ms Staniforth: I am not sure that I would limit it to the AHRC because the type of research that we are involved in, if you look at the breadth of the heritage

moving outside from collections into buildings and, indeed, into archaeological sites as well, I think that the other research councils are involved with that as well and, therefore, I would not see it the province of a single research council but that then begs the question of what is the overarching organisation that can knit the research councils and, indeed, the universities together to broker arrangements for applied research. I think it goes outside conservation science as well, I think it embraces all applied research.

Q561 Chairman: Professor Heyman, how does the Cathedral Architects' Association ensure that the latest research, for example in infrastructural engineering or erosion, is brought to bear on the maintenance of our cathedrals?

Professor Heyman: It is very difficult to find engineers, and always has been, who are interested in working on these problems and this has been true, to my knowledge, for example, in this century. For St Paul's Cathedral there was one engineer in Freeman, Fox who in his spare time, so to speak, was interested in this and was prepared to devote rather monetarily unrewarding engagement in helping there or at Westminster Abbey, R T James and Partners had a man there who did that and so on. Any big firm of consulting engineers can put their hands to this work but Ove Arup, for example, out of 1,000 engineers had just one who was interested in this. Again, it was rather typical and they ran a little section around him, they were a big enough firm to be able to do that, but it is very difficult to find people. There are three or four engineers in this country who the Cathedral Architects know extremely well and who they will turn to for advice if necessary and, dare I say it, I think they get good advice from these people.

Q562 Chairman: English Heritage are doing a good deal of work in this area of masonry?

Professor Heyman: Yes, indeed. I think they have cut down a little bit, and I have not been in touch for the last two or three years, but they had a magnificent core of both architects and engineers, grossly overworked all of them. They were unable to do enough technical research, but they did do some certainly, and their advice was absolutely first-rate.

Q563 Chairman: Does the Cathedral Architects' Association link up to English Heritage on this?

Professor Heyman: Perforce really, because a lot of their money comes through English Heritage and, therefore, they come in contact with the technical people there who also give advice. There is an interesting situation, if I may digress, that the advice given by English Heritage is not mandatory at all and the cathedral is free to do what it pleases, but if they do what they please, they will not get a grant.

Q564 Lord Chorley: Presumably, the architects in the Cathedral Architects' Association do not just do cathedrals, they do historic houses and everything else?

Professor Heyman: Absolutely so.

Q565 Lord Chorley: Therefore, there is a bit of serendipity going on in that way?

Professor Heyman: Yes, indeed, and as for the engineers the restoration of cathedrals, and to some extent country houses, is not rewarding financially and so they are normally embedded in a larger practice doing general architecture.

Lord Chorley: Nothing is very rewarding in country houses!

Q566 Baroness Platt of Writtle: The Trust's written evidence calls for a clearing house to be established to liaise between researchers and end-users. What form do you see this taking and who will administer it?

Ms Staniforth: Yes, I think this carries on from the previous question from Lord Redesdale about the AHRC possibly seeing themselves in that role. I think we see the role as needing to embrace all of the research councils and, therefore, whether HEFCE or the Department for Education and Skills could in some way enable that sort of mechanism to take place, I am not sure. The sort of thing, I suppose, that we envisage would be a website that was divided into various sorts of subjects of interest which would not just be conservation science or conservation of the heritage but could embrace all of the applied research that is considered by the research councils.

Q567 Baroness Platt of Writtle: Who will administer that?

Ms Staniforth: I am wondering if DfES could at least provide the money to pay a third party to administer it.

Q568 Baroness Platt of Writtle: We interviewed the research councils and they did say all the research councils had an input into AHRC.

Ms Staniforth: But that was just presumably with respect to conservation science?

Q569 Baroness Platt of Writtle: Yes.

Ms Staniforth: One could do it simply for conservation science.

Q570 Baroness Platt of Writtle: That was why we asked the question, yes.

Ms Staniforth: I think that being aware of other areas of applied research that goes beyond conservation science—and I know it is only conservation science that you are teasing out today—the economies of scale would suggest that it would be better to do

something more overarching. That is what it would seem as an end-user anyway.

Q571 Chairman: I have to say I certainly envisaged this, as you have put it, the problems arise as an end-user that you have a host of problems that want answers and there are out there people potentially who have the answers to some of your problems and you need, as you put it, a clearing house.

Ms Lithgow: There are various local initiatives which are going on and I think it is important that there is not only a national dimension to this but an international dimension because for the credibility of conservation science we are building on and working with international researchers as well as our local home-grown conservation scientists. For example, ICON CC, the Metals Working Group does transmit a list of what research projects are currently undergoing. So having just an accessible list of who is doing what research, what the facilities are, what the researchers are interested in as well as the questions that the conservators are interested in being asked, to have some transparency in that would at least enable the networking to be more free flow and not perhaps constrained to those who can afford to go to the largest conferences.

Q572 Chairman: Might it be a viable role for ICRON?

Ms Lithgow: Or ICON.

Q573 Chairman: The Rome-based institute?

Ms Lithgow: Yes, they do have a research agenda, but I think it needs to be a national dimension and then one can encourage a sort of European network also.

Q574 Lord Chorley: Following on with the themes we have just been talking about, you will know, I am sure, that English Heritage recently published a research strategy for the built environment and has signed a concordat with some of the research councils. What are your views on this development? Do you see any prospects of similar developments in the field of movable heritage? That is perhaps the key point.

Ms Staniforth: Yes. We really welcome the English Heritage research strategy because I think it is very interesting it has covered all the research that looks into the historic environment, so it is the arts and humanities and social science research as well as the science and technology. I think that their scoping of the research needs across the nation, across England, is an extremely valuable tool to say, "These are the needs of the sector". I think that we would welcome something similar for the movable heritage, the question would be where is the equivalent organisation or at least the organisation with the capacity and resources to carry out a similar study for

the movable heritage? By rights, it should be the Museums, Libraries and Archives Council, but they simply are not established with the same level of staffing as English Heritage in order to do this strategy.

Q575 Lord Chorley: Devil's advocate might say the movable is just too disparate. Would that be a fair remark?

Ms Lithgow: I think it has a lot of common and shared interests. I think the principles and ethics which underlie the movable collections are very similar. I think English Heritage has for the built environment all the sites which represent a range of those things, the fact that we do not have an owner of a range of national museums as well as a range of privately-owned historic houses that represents the end-users' interests in one place as well as English Heritage does for the built environment. I would have thought there was scope for an association, perhaps a conservation science committee, around the movable heritage, but it had represented to it the people who have been the major players on this in the past, for instance the National Gallery, the Courtauld Institute, the V&A and the British Museum involved as well as representatives of big owners of movable collections both in historic houses and museums. It would be the organisation that hosted that research committee that perhaps would have that mandate.

Q576 Chairman: When Neil Cossons from English Heritage gave evidence to us, he told us in his oral evidence that his organisation would be willing to provide a secretariat to facilitate co-ordination between major institutions involved in scientific research in both the movable and immovable sectors. How does that strike you as a proposal?

Ms Lithgow: Very serendipitous in the true principle of conservation science.

Q577 Chairman: You do not think it would make English Heritage too dominant in this area?

Ms Lithgow: I think they have worked as collaborators and partners very well with us in the past.

Q578 Lord Chorley: I wonder if Professor Heyman has anything coming in from right out on the wing, so to speak?

Professor Heyman: I come back to this question of money, so to speak, before but up to about 20 or 25 years ago the Building Research Establishment, for example, initiated its own projects in-house. Somebody would have an idea, get permission from the director and the little team would start working on something there, but now they are on a customer-driven basis that everything has to be paid for, so to speak, and there is not room for that sort of initiative

in-house. Wherever I look in this sense, I think it is difficult to envisage something starting up in places where it should be started up, in one of the research establishments like this. There was an example which got outside this about 20 years ago, the question of acid rain and the destruction of stonework there. This came from a House of Commons Environment Committee, I think, pointing to the pollution that was going on. Of course, industry had abandoned burning fossil fuels and they were all burnt by the Central of Electricity Generating Board, so they were the prime suspects in all this. They funded a major inquiry which lasted for seven years and produced a magnificent report and really to some extent solved, or partially solved at any rate, the problem of what the cause of pollution of limestone cathedrals was, for example, how it worked and what the prospects were and so on. There the money came from an interested party. I am sorry to come back to this, but it is difficult to know of major projects like this which could be started up without such external intervention. The minor projects can be done in universities by individuals who would be interested in writing a scientific paper on the matter.

Q579 Lord Chorley: But a strategy needs a centre in it?

Professor Heyman: Yes.

Q580 Chairman: Can I come back just for a moment to this question of movable versus immovable strategies and so forth. Does it make sense to have separate strategies for movable and immovable?

Ms Staniforth: We, the National Trust, really struggle with the number of government-appointed bodies who deal with the heritage because of the breadth of the National Trust's responsibilities: we are dealing with Natural England for the land and countryside issues, we are dealing with English Heritage for most of the historic environment and we are dealing with the Museums, Libraries and Archives Council for our collections in our houses. We would prefer just to have one body who dealt with the heritage, but then we are a unique organisation in terms of the breadth of our interest. From the point of view of the disparate, I am very interested that Sir Neil Cossons volunteered to do a research strategy for the movable heritage because it is absolutely moving into the museum arena, but, as I said before, I think that the Museums, Libraries and Archives Council do not have the same infrastructure and resources that English Heritage have.

Q581 Chairman: That is absolutely clear. Can I take up one other question here which is that again in your evidence you talk about the difficulty of applying for grants from the research council or EU Framework Programme. Would you see a role for a co-ordinating

body, such as English Heritage, in facilitating the preparation of such applications from heritage organisations?

Ms Lithgow: I think that there is a large amount of time devoted to the preparation of these bids and no doubt the more you do it, the better you get at it. I think enabling wide access and transparent process for that preparation of the bids is perhaps the thing. I suppose I am just slightly nervous of something that sounds too mechanistic that might stifle innovation and we need to balance both of the central views. We do this in the National Trust the whole time, we have got the central views of the National Trust and have a relationship with the regions and the properties and out of the creative tensions that exist between the two come a lot of the solutions to our challenges, so having something that was too prescriptive I think would be possibly sacrificing something that comes through the spirit of enterprise, innovation and interest.

Q582 Baroness Platt of Writtle: We have heard that the conservation science profession is facing a crisis: the skills base is small, the age profile poor and career development opportunities are limited. We have also heard from the Science Museum that the development of dedicated courses for conservation science may not be desirable for what are good scientists working in conservation. I am not quite sure what the difference is, but never mind. What is your view on this issue and what can be done to improve career progression in this field?

Ms Staniforth: Can I make a general answer to start with and then Katie will make a more detailed one about proposals for training. First, I assume when one says the age profile is poor, by that I think we probably understand that there is not a flow of new young scientists.

Q583 Baroness Platt of Writtle: Everyone is getting older, that is the trouble.

Ms Staniforth: Yes, exactly. So we have quite a lot of conservation scientists who now are in their forties and fifties and we are looking for the 20 and 30-year olds to come in and replace those persons who may retire in the next 10 years.

Q584 Baroness Platt of Writtle: With the hard sciences too, yes.

Ms Staniforth: That is definitely an issue. As far as the specific point about whether it is best to have conservation scientists created through university training courses or to have good scientists working in conservation, my personal view from practice is that nothing beats a really sound first degree in a straight science subject because you then have that solid, academic scientific training which you can apply to any research challenge that you face when you are

working. I think there is a new conservation science course that has just started at the University of Southampton on their Winchester campus which has been advertised and will start this September. We believe that courses like that have a place for mid-career training and I think that starts to address the age profile issue of the profession and that people can come in with maybe an arts and humanities background, they then do their vocational conservation training and then they can pick up the conservation science in modules either by distance learning or by taking a year out to do that sort of thing.

Q585 Baroness Platt of Writtle: This you might call “continuing professional development”?

Ms Staniforth: Exactly.

Professor Heyman: Before Katie Lithgow elaborates, could I interpret on behalf of the engineers. The engineer’s training is very long when he or she graduates after three or four years, there is still three or four years before they become engineers. By that time, they are probably not interested in going into conservation even if a path were open to them—there is no real path there—so they stay as mainstream engineers and they just get lost as far as conservation is concerned.

Q586 Baroness Platt of Writtle: You were talking about quite a lot of them thinking in terms of volunteering and you were talking about that with the Cathedral Architects because the life is so short.

Professor Heyman: Yes.

Q587 Baroness Platt of Writtle: I suppose to a certain extent today, just as you did, somebody might get hooked by it and do it in their spare time.

Professor Heyman: There are still a few nutters about, yes!

Q588 Chairman: Look at the conservation railways and steam engines.

Ms Staniforth: What would we do without them? We are dependent on our volunteers.

Ms Lithgow: I think there is perhaps an opportunity for scientists in training to have their appetite whetted for conservation science as career opportunities at their first degree level, perhaps through modules which are offered on conservation. Perhaps the universities which have an associated conservation laboratory or museum with a conservation laboratory attached would be a good model for that. For instance, the textile conservation centre in the University of Southampton, there are links between Cambridge and the Hamilton Kerr Institute, any amount of links between the various University of London colleges, links between Sussex and West Dean as well as the Gateshead course.

There is a whole nexus of universities up in the North East, like Newcastle and Durham, as well which produces scientists who could take advantage of having some of that model just to increase their awareness of it because we may not be giving that opportunity to scientists to make that choice about going into conservation. Equally, if the PACR accreditation process, which has been developed for preventative conservators now, there is a route for conservation managers, develops to embrace conservation scientists, there will be a standard there which involves the CPD to demonstrate that you have acquired the knowledge about conservation ethics as well as the professional standards that you have to maintain as a practising scientist to get accreditation. As Sarah says, there are other routes of people coming into conservation science where you may have both scientists as well as arts graduates going into conservation training who then pick up as part of the their MA thesis a research topic which then fires them up for the rest of their lives and they would go back into conservation science as a career after that. I think there is a feeling amongst the conservation scientists that there is only so far that you can scratch a living from bursary to bursary and there is a decline in the number of permanent conservation scientist posts that are about with job cuts in some of the major nationals. It may be that is a reflection of the modern working environment and there is a piece of socio-economic work to be done there within the English Heritage strategy theme that relates to that which says what the career path is of the professionals via a bit of research, but there is a need to have that core scientific support within an institution in order to be able to drive forward projects from inside rather than just through freelance collaboration.

Q589 Baroness Platt of Writtle: To connect up the developments in modern hard science to see that they are being applied?

Ms Lithgow: Yes, who knows? I do not know what is going on in some specialised area of science which may be some analytical technique which might be the thing we have been crying out for in conservation projects to advance art.

Q590 Chairman: Am I right that there is no MSc course as such in conservation science? You alluded to the Hamilton Kerr Institute and there is also the Courtauld for people working in the fine arts there are courses they could do in conservation which do attract some scientists in, but at the moment there is no MSc course as such in conservation science.

Ms Lithgow: I was going to say for V&A RCA studentships and there are MScs as well as MSc studies available in conservators.

6 June 2006

Ms Sarah Staniforth, Ms Katie Lithgow and Professor Jacques Heyman

Ms Staniforth: There is a Winchester one about to start.

Q591 Chairman: Is that an undergraduate course or an MSc?

Ms Staniforth: It is an MSc.

Professor Heyman: The Architectural Association runs a two-year conservation course. This is for buildings, without a degree, I think probably a diploma at the end of it, but it is an extremely good course.

Q592 Chairman: Can I finally end by asking you a little bit about or perhaps going back to this question of knowledge transfer from academic researchers to practitioners. You talked about a need for perhaps a clearing house, but looking at it the other way around, to what extent do you feel that there is at the moment a good process of knowledge transfer and, if not, are there ways of bridging the gap?

Ms Lithgow: I think broadly speaking most of the knowledge transfer is through the formal journals across the whole sector for the movable as well as the immovable heritage. I think it is fair to say that these are more readily available to institutional workers rather than freelance workers though the PACR accreditation and CPD development would perhaps encourage to devote more time to that than perhaps has been available in the past. I think though that there is a suspicion that simply because of the volume of work there is research done in people's day-to-day jobs in museums which they do not have the time to publish or necessarily have organs to publish in. It is having the opportunities to put that work out there.

Q593 Chairman: How far do you feel that your very splendid *Manual on Housekeeping* which, thanks to Sarah, I have a copy of, is now being widely used?

Ms Lithgow: We have had a very successful amount of sales, I think it is 3,000. It is into the second reprint so somebody is buying it. It is pleasing to know that it is both institutional people who are using it as well as members of the public, so I think it is a book that does bridge both the professional and the lay audience. It sort of stands in the middle of what people can expect to do in their own collections whilst steering them towards the professional specialists.

Lord Chorley: It is rather PR for conservation. As a layman myself, that is how I always regarded the *Manual on Housekeeping*, as very good PR. I am not sure my wife follows it, but she has not got much to follow it on!

Chairman: Thank you very much. I think that brings us to the end of our questioning, and indeed just on the dot of one. Thank you so much for coming along. Should there be anything else that you would like us to know about, please do write. We are hoping to get the report published before the House goes into recess at the end of July.

Baroness Platt of Writtle: I think we are very impressed by the National Trust and the Cathedral Architects who are on a shoe string, as it were, using volunteers and that does make a difference, does it not, and, therefore, your experience is very vital, I think.

Q594 Chairman: Yes, I think that is so. I also think the point that you were making about how vital it is to try to bring in people who have got the hard training in science or engineering and get them interested in these issues.

Ms Lithgow: That is one of the points that we were reflecting on before coming in today about what a big means of access it is for the public to understand our collections, making available the results of the study and that conservation science gone into caring for them, and the *Manual on Housekeeping* does illustrate that.

Chairman: We should finish the formal session and thank you once again very much indeed for coming.

Written Evidence

Memorandum by the Association of Local Government Archaeological Officers (ALGAO)

THE ROLE OF ALGAO

ALGAO is the national body representing local government archaeological services on behalf of County, District, Unitary and National Park authorities. ALGAO co-ordinates the views of member authorities (110 in total) and presents them to government and to other national organisations. It also acts as an advisor to the Local Government Association on archaeological matters.

Individually, in the course of their work for their Authorities, our members are responsible for archaeological records, archaeological inputs to the development planning process and to agri-environment and forestry consultations, the conduct of rescue excavations and their subsequent publication, the management of archaeological sites and landscapes, and liaison with local voluntary heritage groups, museums and other bodies. Our members are also responsible for the protection and conservation of the archaeological resource including the material remains of the past.

THE REMIT OF THE INQUIRY

Before presenting evidence to the inquiry, ALGAO would firstly like to challenge the usefulness of the inquiry terms of reference with respect to the definition of “cultural heritage”. The exclusion of townscapes and landscapes from the inquiry’s definition of cultural heritage runs counter to government heritage policy for the past 15 years, detailed for instance in Planning Policy Guidance notes 15 (historic environment) and 16 (archaeology) and the recent government statements on the historic environment: *A Force for Our Future and Review of Heritage Protection: The Way Forward*. The definitions of heritage contained within these documents emphasise the importance of the landscape context for heritage items and this in turn reflects standard and accepted thinking within the cultural heritage sector for at least the past 40 years.

ALGAO therefore considers that there is only limited value in using scientific methods to study historic buildings and archaeological objects if the landscape context of such items is not also studied. Much scientific research, including many of the most important applications of science to cultural heritage, takes place at the landscape scale. ALGAO members ensure that archaeological investigations (often funded by developers) take place within a recognised research context and include appropriate scientific techniques, thus the investigation of site context, deposits and artefacts combine to provide the rich tapestry of evidence required for reconstructing past societies and environments. Ensuring that our members have easy access to sufficient specialist scientific advice is crucial to this role—in England, English Heritage provide this invaluable service through their Regional Science Advisers and other specialists. This includes for instance, remote sensing techniques such as geophysical survey, laser surveys and thermal imaging; environmental archaeology and scientific dating as well as artefact conservation and analysis. Whilst ALGAO acknowledge that it is necessary to limit the scope of Inquires, we strongly feel that scientific applications for the conservation of historic buildings and archaeological objects should not exclude landscapes and townscapes and that such an exclusion will severely limit the usefulness of the inquiry for the cultural heritage sector.

QUESTIONS ON CONSERVATION SCIENCE

ALGAO believes that there is considerable evidence for the use and application of conservation science to understand our cultural heritage. This includes for instance techniques of dating archaeological objects and the remote sensing of archaeological sites. Research into the challenges of preserving sensitive archaeological remains in situ is a particular priority in urban, wetland, coastal and marine environments where remains have often been preserved in anaerobic conditions vulnerable to perturbation by land use or climate change. Once again, the separation of an artefact and its landscape context is unhelpful to informed conservation. Likewise the contribution of archaeological and palaeo-environmental evidence to understanding past environmental change is excluded.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

With respect to archaeological objects and historic buildings, we believe that IT can contribute to enhancing public engagement with cultural objects if they are explained in terms of their context and wider cultural associations, and not presented simply as in terms of their ascetic attributes or financial value. Explaining an historic building or archaeological site, for instance, within the wider context of its local historic settlement or place is the key to engaging local communities in their own heritage, which in turn is essential to achieve the long term conservation of the cultural heritage. For archaeological objects in particular, if their context in terms of place of origin and wider associations is not provided as part of the provision of public information, there is a danger that such objects are understood simply in terms of financial value. Indeed, in the UK many thousands of archaeological sites are damaged every year by treasure hunters and many times that number of cultural objects are removed from their archaeological context without proper record by people who have little or no appreciation of the archaeological context of cultural objects. There is also a large international market in the buying and selling of archaeological objects from UK, many of which have been illegally removed from the proper context without record. If the process of the destruction of our irreplaceable cultural heritage is to be reversed, it is essential that the importance of the context of archaeological objects is promoted and explained.

ALGAO therefore believes that IT can contribute to enhancing public engagement with cultural objects without compromising their conservation if the importance of the context and wider associations of such objects is presented and promoted as part of the process of making the objects publicly assessable.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

We have no comment on this point.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

The national network of 80 local authority historic environment records (HERs) is one of the most important source of information on the cultural heritage. They contain over one million archaeological and other historic environment records of sites, objects and landscapes. The information in HERs is held on sophisticated databases linked to GIS and all are available as public records. Currently, 14 HERs are also available on the internet and these are put forward by ALGAO as examples of the successful use of IT to improve access and understanding of cultural objects.

In addition, it is the policy of ALGAO and English Heritage (the national lead body for information on the historic environment) to make HERs as widely accessible as possible. To this end English Heritage, in partnership with ALGAO and the Institute of Historic Building Conservation (IHBC) are currently in the process of developing an electronic Heritage Gateway. This will provide a single dedicated point of access for information on the historic environment (archaeology historic building and historic landscapes) for professionals and the public. The 1st phase of the Heritage Gateway is due to be completed in the summer of 2006 and this is also put forward by ALGAO as one of the best examples in the UK of the use of IT to improve public access and understanding of cultural objects.

13 February 2006

Memorandum by the University of Bristol

The Interface Analysis Centre, University of Bristol is a focal point for the application of science, engineering and technology to our cultural heritage. Bristol has very strong track record in this area and has received over £1 million of funding from EPSRC and DTI to carry out research in this area in recent years. Examples include:

- Deterioration of limestone by SO₂ and NO_x pollutants;
- Classification of hydraulic lime mortars and pozzolans for use by the UK construction industry including both conservation and new build;
- Study of the mechanical properties of lime mortars for use in conservation and new build.

Though their priorities differ, much interest also exists in the Atlantic-bordering regions of the European Union (EU). Materials Network Atlantic Area (MNAA) is a collaborative project supported by the European Union INTERREG IIIB Programme and co-financed by the ERDF bringing together research institutions along the Atlantic seaboard of the EU. The University of Bristol is in partnership with the Universities of Aveiro (Portugal), Exeter (UK), Limerick (Ireland) and Salamanca (Spain). A central focus of the network is the environment and sustainable development of materials for maintaining cultural heritage. The associated collaboration contributes to the UK's goals by strengthening skills, research, innovation and technology transfer.

More recently, the University of Bristol was selected to co-ordinate the sustainable use of materials network, Sustainable Masonry Construction (SUMACON). This network is funded by the EPSRC as a result of the Government's drive to promote the sustainable use of materials and establish links between academia and industry. Network meetings are actively developing links between British universities and various industrial sectors including architects, engineers, manufacturers and suppliers.

Network activities include the promotion of research to a wider audience and the public. This has been achieved by contributions to:

- “A Celebration of UK Engineering Research and Innovation”, ExCel, London, November 2004. The University of Bristol participated in the “Built Environment” theme of the exhibition and briefed members of the international review committee on current research concerning lime mortars and low embodied energy building materials;
- Home Building and Renovation Show, Birmingham, 2005. In collaboration with Hydraulic Lias Limes, a display was developed showing collaborative research and highlighting university—industry links.

Following the success of the aforementioned events, SUMACON members were keen to promote their university research to the wider community, the majority of which is directly relevant to preserving the nation's heritage. However, although an EPSRC funded scheme already exists, entitled “Partnerships for Public Engagement”, the academic and industry partners felt that the extensive work involved in preparing a submission was beyond their resources. The Guidance Notes and Best Practice Guide for this scheme amount to 91 pages. While the partners feel they have much to offer towards creating greater public awareness, until a much more user friendly scheme for funding is developed, little progress would seem likely.

Figure 1 summarises the relationship between the SUMACON network, university partners, funding bodies and industrial partners. The SUMACON network acts as a focal point between universities providing a forum in which relevant projects can be discussed with industrial partners. To bring these nationally important projects to fruition, funding is required. Recent experiences have indicated a reluctance to fund projects which are not seen as being at the cutting edge of modern technology. Unfortunately, much of the essential research necessary to ensure the UK is in a position to maintain its heritage properly does not fall into this category. In many instances, adoption of new technologies, especially in building, are driven by the ability to create short term profits at the expense of long term integrity and usability. The environmental impact of traditional techniques is often lower than modern equivalents. The reintroduction of traditional technologies for modern applications has obvious benefits. For this reason, it is essential that the benefits of research into these materials are properly understood and promoted.

4. Where it exists, co-ordination is informal and ad-hoc. The Forum is aware of valuable work being carried out at present at Bristol, Bath, Bradford, Paisley and Herriot Watt universities, although this awareness is anecdotal and may not be exhaustive. We are aware of little active co-ordination between these projects, although informal networking between members of different departments does take place, sometimes actually through the Forum.

5. The Forum attempts to facilitate dialogue by encouraging papers within its Journal, as do other organisations of similar standing. However, the Journal serves a wide readership, including craftsmen/women and similar, and cannot afford to become a recognised refereed academic journal. The papers from valuable research therefore often find their way into refereed journals which rarely have relevance to those likely to have practical use for the results. *The Journal of Architectural Conservation* attempts to fill this gap, but much of the research still remains too specialised for this broad readership.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

6. Paul Livesey, a cement chemist with Castle Cement Ltd., is a valued member of the Forum's main committee and also a member of the EPSRC research assessment college. He reports that conservation research projects receive very limited resources when compared to items such as innovative nanotechnology. This is in spite of the established and demonstrable need for such research work in critical areas. There is also a very distinct difficulty in financing co-operative work with other universities within the EU when such work does not necessarily fit easily into the vision of "grand" EU framework schemes. Funding for conservation research is therefore patchy, and often obtained by a round-about route, rather than directly through its own merits.

7. The UK has the capacity and skill base to maintain the best of its built cultural heritage to a very high standard indeed, but there is a very real gap between the quality of work carried out at this level, and that which applies to the built heritage of medium or general significance. Whilst this might be seen as acceptable, the result tends to be an environment of beautifully-kept and presented monuments surrounded by a sea of partly-damaged context.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

8. Within the Forum's specific field of interest, the best work within the UK is very good indeed, although it is poorly disseminated and little known outside a small circle of individuals who take a high degree of personal interest. Outside this field there is a rapid fall-off in quality, usually triggered by limited access to the necessary information. The Forum attempts to overcome this, but is restricted by limited resources, and by being an entirely voluntary organisation. We do note that this pattern seems to prevail in allied fields as well.

Is there a satisfactory process to develop practical applications of conservation research for the market?

9. This is an area of very real concern. The development of practical applications from research is of real value, but is left almost entirely to commercial enterprises, resulting in valuable information becoming confidential, as commercially sensitive. There is a strong legacy of damage to the UK's built heritage caused by past "fads" of poorly-established research compounded by commercial salesmanship, and a consequent issue of lack of trust. It is the responsibility of a conservation professional to examine this type of information critically in order to assess the suitability of a particular technique for any particular project. The result is a form of impasse, where only the less critical projects can afford to use new technology, and hence risk failure, whilst the more important are restricted to using information already in the public domain.

10. The Forum is an active member of the EPSRC-funded SUMACON network for research into sustainable masonry construction which is run from the University of Bristol. This initiative is expressly intended to encourage links between academia and industry, and shows considerable promise. It is, however, notable that this is a "sustainability" initiative (see paragraph 3 above).

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

11. Better dissemination of conservation science would lead to better public understanding of the built heritage, as well as to better work outside the highest level. It is reasonable to hope that it might also encourage new practitioners to the field and to overcome the perception of the field as rather "fusty" and unexciting. In reality, it is as vital as any other field of intellectual endeavour for those with the necessary talents.

 USE OF INFORMATION TECHNOLOGY

12. Although individual members of the Forum have concerns in this field, we regard it as outside our area of specific expertise.

13 February 2006

Memorandum by the Council for British Archaeology

The Council for British Archaeology is an educational charity working throughout the UK to involve people in archaeology and to promote appreciation and care of the historic environment for the benefit of present and future generations.

CBA has a membership of 620 heritage organisations and c.10,000 directly subscribing individuals of all ages. Our institutional members represent national, regional and local bodies encompassing state, local government, professional, academic, museum and voluntary sectors. We work with a network of CBA Groups at the regional level in England, and with their national counterparts in Wales and Scotland, CBA Wales/Cymru and the Council for Scottish Archaeology.

The Select Committee's inquiry into science and heritage is timely. In this submission we focus on information technology, as others are better placed to cover conservation science issues.

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

1. By raising public awareness of the cultural heritage, including archaeological sites and monuments, above-ground buildings, as well as portable objects. This may include the development of new web resources, as well as more sophisticated finding aids for existing web sites. Work done by the Historic Environment Information Resources Network (www.britarch.ac.uk/HEIRNET) and the Common Information Environment (www.common-info.org.uk) on bringing together information providers will be important in preventing duplication of effort and in supporting interoperability between resources. Surveys suggest that the public are overwhelmed by the provision of information and seek trusted sources.
2. By providing means of remote engagement with the cultural heritage. These may range from simple image-rich web sites to sophisticated three-dimensional virtual reality visualisations, including sound and lighting effects. Such sites can be used where the cultural heritage is itself remote or inaccessible (eg the National Trust for Scotland's St Kilda site, www.kilda.org.uk), or in the case of underwater archaeology, or to allow access to particularly rare or fragile cultural artefacts. Technologies ranging from 360° QuickTime photographic panoramas to detailed 3-D laser-scanned models can provide global access which does not impact on the original items. The reconstruction of virtual surrogates of fragile monuments (such as the French experience with Lascaux), or the Irish with New Grange, indicate possible applications of laser-scanning technology. Some of the work undertaken by the partners within the EC 6th framework EPOCH Network of Excellence (www.epoch-net.org) is fostering collaboration between computer scientists and cultural heritage professionals to work on these areas. The Ename Center in Belgium (www.enamecenter.org) is a world leader in this field.
3. IT can also be used to virtually reunite collections that have been dispersed. For example, a virtual reconstruction of the Parthenon friezes can provide a complete vision of the extant structure.
4. IT can also help engage an audience in the interpretation of the cultural heritage by emphasising the differences between extant finds and reconstruction, or by providing alternate interpretations.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

5. Improvement is essential if the UK is to compete within the global tourism market and to match the increased expectations for "infotainment". UK galleries and museums often lag behind in their use of IT. Such investment is expensive and cannot be a one-off exercise, but the use of virtual displays can also help capture additional markets and assist museums and galleries serve their educational aims.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

6. Cornucopia (www.cornucopia.org.uk) and the 24-hour Museum (www.24hourmuseum.org.uk) provide excellent frameworks for improving access to UK museum collections. In Scotland the work of the RCAHMS (www.rcahms.gov.uk) in providing online public access to its National Monuments Record through Canmore and Canmap has been a trailblazer. In the Higher Education sector the work of the Archaeology Data Service (ads.ahds.ac.uk) in providing an integrated index to the UK's cultural heritage has demonstrated how told developed for the scholarly community can have much wider application. The British Museum's Compass site (www.thebritishmuseum.ac.uk/compass) is also of international importance. At the level of gateways and portals these sites are ahead of most of what is available in the rest of the world, although in the case of individual museum and site displays there are some outstanding European examples, such as Lascaux in France (www.culture.gouv.fr/culture/arcnat/lascaux/en/), or the Giza Plateau mapping project in Egypt (oi.uchicago.edu/OI/PROJ/GIZ/Giza.html), or the Troy Virtual Reality model (www.uni-tuebingen.de/troia/vr/vr0101-en.html).

13 February 2006

Memorandum by the Crossness Engines Trust

1. The Crossness Engines Trust is pleased to respond to the inquiry into science and heritage. The Trust is a registered charity that co-ordinates a team of unpaid volunteers to restore the building and engines of the nineteenth century south-east London pumping station that was constructed to address "the big stink". To date one of the pumping engines has been restored to working order, together with much of the pumping hall's associated iron work. A small exhibition has been created and (volunteer) research is being undertaken into the site's history and workforce. Currently there are five steaming days in the year to enable the public see the engine working. Also twice a month the site is open for advance-booked guided tours. There is still a considerable amount restorative work to undertake both on the buildings and the pumping engines. The overall goal is to restore much of the original works and create an exhibition of sufficient stature that visitor interest will warrant the site being permanently open to the public.

2. The restoration of Crossness Engines could conceivably benefit from heritage conservation science. However to date most of the engine restoration work has been conducted by volunteers without the use of the latest conservation technology. Advice on paint colour determination, bright metal preservation, brick cleaning etc is available from various sources but a central reference source would make the latest science & technology usable for the Trust and other similar organisations.

3. The Trust has very limited financial resources. Conversely Crossness Engines does have a very real heritage value as it relates to a historic period of London's history that saw a tremendous improvement in public health. It is also one of south east London's most prestigious industrial heritage sites and is well placed to provide the new Thames Gateway development with a key heritage amenity (Crossness is has grade 1 industrial building listing (the only other one in SE London is Tower Bridge).

4. Consequently while the Trust is not able to afford costly analytical and restorative techniques, it is in a position (should it be appropriate) to provide a platform to develop such science and to contribute to the Trust's public engagement with an understanding of conservation restoration science and technology. That Crossness Engines themselves have an obvious connection with science with engineering and environmental health means that (again if considered appropriate) extending the Trust's public engagement to include how heritage conservation science was used in the Crossness restoration would likely chime.

5. Aside from finance, one difficulty the Trust would face in considering conservation science technology, and in the use of IT to enhance public engagement, is in knowing and assessing what is potentially available. Here a one-stop point of initial contact that could assist in identifying likely promising options would greatly facilitate matters. At the moment we are not aware that such a contact exists.

6. Further information as to the Trust's work is available from www.crossness.org.uk

February 2006

Memorandum by The Heads of Conservation & Science Laboratories in UK National Museums, Galleries & Libraries

The breadth of involvement in the subject area will undoubtedly be addressed by the submissions from individual organisations and groups. We comment here as senior managers of one of the principal stakeholders, responsible for delivering conservation and scientific research to the UK national collections.

The number of conservation scientists in the UK is small: some conservators are able to undertake valuable scientific research; some university groups are regularly involved; and there is a very small number of independent researchers. Only larger museums, galleries, libraries and heritage agencies are able to fund and resource full time posts. This very small group plays a key role in direct work for their institution, but it also provides essential scientific interpretation between the largely practical in-house conservation questions and the outcome of research from university or other experts.

It is our view that conservation science in the UK is a relatively small resource which has a proven track record in delivering and attracting high level applied research which directly benefits preservation of the cultural heritage. It has established a strong international reputation, but deserves greater support for both research and strategic planning of research resources to allow the potential to be fully realised.

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

1.1 There is no central or formal co-ordination of conservation science between different bodies. Aside from the absence of this remit or resources, this is at least partly because conservation science is a broad discipline dealing with a wide range of materials and calling upon scientific expertise across many different disciplines. Its impact to practical conservation may be very focused, such as understanding the condition or behaviour of individual objects or structures, or it may lead to better general understanding of materials and preservation strategies. This breadth of question and application together with the cross disciplinary scientific content has to be recognised in any co-ordination process.

1.2 The institutions holding national collections have a key role, along with English Heritage, Historic Scotland, Cadw and the National Trusts of both England and Scotland, in interfacing between practical conservation delivery, applied conservation science, and new conservation research. We have a primary duty to provide practical conservation to improve the preservation and accessibility of the collections. But, where resources allow, each of our institutions also provides some level of conservation science to inform this work better and to increase understanding of the collections. By delivering applied scientific techniques in-house and working closely with conservators, these scientists are able to identify priority areas for improved conservation methods; and through scientific links to the university community may be able to stimulate more speculative or fundamental research collaborations.

1.3 While this works well at an operational level for each institution, it does not necessarily lead to improved planning at a strategic level. The recent research strategy initiative at the BL is showing how significant such an approach can be to the community. The situation for non-archival artefacts and the built heritage, where the lead role is less clear and collections are more diverse, is that there is a lower degree of co-ordination either between institutions or with the university research fields.

1.4 International conservation bodies such as the International Institute of Conservation (IIC), the International Council of Museums Conservation Committee (ICOM-CC) as well as the Institute of Conservation Science (ICS) maintain specialist groups, publications¹ and conferences. The increased professionalism of the conservation community in the UK which has led to the convergence of separate groups into the new Institute of Conservation (ICON) will also help to improve communication within conservation disciplines. Should the Institute of Conservation Science also join into ICON it will greatly improve the scope for closer interaction between conservation and science. ICON and the UK national bodies arrange conferences and meetings which include conservation science and draw in research and conservation groups internationally. This leads to national and international collaboration in, although not necessarily co-ordination of, research.

1.5 Co-ordination is partly driven by funding: research council support is now directly available to some museums and heritage bodies through the AHRC whose funding has already established effective centres through university and museum groups. The new academic analogue status with AHRC might be followed with the EPSRC to the benefit of major science laboratories in museums & galleries. Both NERC and EPSRC have provided significant funding for conservation science, although this has concentrated more on scientific development than conservation application. And the EU funding frameworks have provided both funding and direction in identifying EU-wide conservation issues.

1.6 Conservation science has a low profile. Scientists or research groups in universities often become involved through personal contacts or interests, rather than from knowing the scientific needs of the discipline. The existence of conservation questions may not be known or well formulated; the research benefits in terms of

¹ Especially the peer reviewed journal "Studies in Conservation".

grants and high level peer reviewed science publications may not be evident; or the conservation problems may require more routine analysis or applied research time than can be made available.

1.7 Strengthening the museum base of full-time conservation scientists and enabling them to serve a wider community of smaller museums and other bodies would greatly increase their ability to build relevant links between the heritage and university communities. The improvements in critical mass would help deliver an improved service and provide a focus group which would help to provide co-ordination of scarce resources.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

2.1 Most of the national institutions struggle to balance resources so that the immediate conservation needs of the collections are met for exhibition and displays. It is yet more difficult for projects which require longer-term commitment of staff and resources with less short-term payback. Conservation science has demonstrated the benefits of preventive conservation and ways of maximising preservation by controlling conditions of storage and display. However there is no doubt that the pressure to deliver essential conservation makes the allocation of adequate resources to longer-term conservation science goals difficult. This has inevitably led to the current situation where the level of conservation science support is lower than it needs to be to interact and provide a “service” for conservation practitioners.

2.2 Nor is the skills base for conservation science outside the national institutions any greater. Since it is clear that there is inadequate conservation science to fully support the current levels of conservation activity it seems inevitable that without some change the situation will be no better for future generations. There are no established training courses for conservation science (and indeed the number of courses for practical conservation skills is small). However good training opportunities can be provided by internships for suitably qualified conservators or scientists in established laboratories, although currently there is no regular funding to support such initiatives.

2.3 Key to ensuring the research is relevant is that the questions really address conservation problems or lack of knowledge, so that the outcomes both inform and influence conservation decisions and practices. Conservation scientists working closely with practical conservators play a pivotal role in promoting effective understanding and communication between different professional groups and in formulating the questions.

2.4 The UK skills base (in conservation science), comes from a range of sources and covers a wide field. It is inadequate either to direct research or to ensure that the results of best practice from recognised research or experience can be fully carried through for many of the institutions which care for the heritage.

2.5 These issues could be improved by the provision of moderate funding which would enable the conservation scientists referred to above to establish better formal partnerships to undertake or commission work for a wider base of users. This might be done by assisting existing units with resources to enable them to provide conservation science support for users from defined geographical and specialist subject areas.

2.6 Long-term needs of cultural heritage will only be met if there is sustainability of the skills base (and sample archives) by long-term staff funding, by the provision of training and internships, and by ensuring that there are opportunities for sharing of skills and experience between workers based in different locations.

2.7 Strengthening the base of full-time conservation scientists would also in theory allow better career paths and job satisfaction. The present situation with a small number of available posts working on essentially a limited field means that some scientists can feel restricted in the type and breadth of research they can do and consequently do not stay in the profession for long. Maintaining specialist expertise built up by individual scientists within the discipline is crucial in providing a balanced skills base with leadership and training ability.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

3.1 The UK has led the field in many developments in conservation science. It still compares well with both European and other countries in terms of quality and relevance of output, as can be seen from the content and contributors to international meetings and publications.

3.2 However more generous funding provided by other countries now has increased their contribution. While we do not particularly support the model, we note that the UK does not have institutions with a common remit and central funding on a national basis specifically for conservation and conservation science (eg the ICN in the Netherlands; the KIK-IRPA in Belgium; the CCI in Canada). Nor does the UK have scientific groups within cultural institutions with equivalent size or funding to match those in France (eg the C2RMF; the LRMH).

3.3 The larger institutions in the UK which can support conservation scientists and laboratories undertake important scientific work. This is generally adapted from well developed techniques, refined to work on complete artifacts or micro-samples and mainly limited by funding. Cutting-edge technology and analytical methods are provided through university research groups, often on a one-off basis, or through research grants, provided that the collaboration or operational costs can be secured.

Is there a satisfactory process to develop practical applications of conservation research for the market?

4.1 Most conservation science research is communicated through conferences and their publication or the conservation journals. Some is published in more mainstream scientific journals, and in EU project reports. The majority cater for English language readership. There is therefore good opportunity for the outcomes to be put into practice in the UK. However there are obstacles to research feeding back into conservation practice:

- Communication—the translation of highly technical science into accessible terms;
- Inaccessible scientific techniques or resources for more routine work; and
- Research projects with deep study of very selected problems, without leading to general principles for improved treatments or practices.

4.2 We suggest that the situation might be improved if it was possible to provide more interpretation of new conservation science research and its application to the conservation community. This requires more opportunities for those engaged in conservation to spend time participating in workshops and subsequent experimentation where new methods can be tried and tested over a wider range of applications. At present the range of such study courses is limited, and their cost is high.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

5.1 We believe that conservation science provides an excellent “way-in” to explaining scientific principles and methods. This is frequently demonstrated by publicly accessible lectures and talks, by small displays, and by involvement in museum laboratories in UK or local Science Festivals. The high-tech examination of artefacts—such as Egyptian mummies or archaeological remains—is highly popular.

5.2 At another level conservation science work can be used for more formal education: work on the preservation of plastics following a display in NMS, and conservation of the Mary Rose in Portsmouth have been used in the recent schools science text book “Conservation Chemistry” by the Royal Society of Chemistry.

5.3 Museums and science centres now have many interactive exhibits which encourage active participation with young people and other visitors. However the presentation of conservation science, explaining how artefacts are preserved and conserved, how the materials are analysed, and how such studies reveal information about the use and history of the objects or their environment, is less common. This is at least in part due to funding—it is a big cost for any one institution to develop and maintain such displays. Perhaps there is scope for a programme of displays to be developed in a more co-operative way between institutions would allow better exploitation of this information.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

- Use of data and images from artefact investigations (radiography, CT scans etc) to support displays of the real objects.
- Virtual display of details of 3D objects, allowing visitor interaction of the angle of view, level of detail etc.
- Virtual reconstructions of damaged artefacts, with visitor interaction and tactile feedback.
- Virtual conservation and restoration—professionally and for the public.
- Live links from active conservation studios or labs.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

7.1 Undoubtedly. Most of the above could be more available to other museums and galleries once they have been developed in one institution. However there is no mechanism for such transfer, which is often the result of individual work rather than funded projects with an aim to wider application. To achieve the latter would require consensus between partner institutions.

7.2 One possible development might be the central provision of conservation records and data about the examination of artefacts. Currently this is managed on an individual basis within institutions as part of their object database. Conservation data would be a significant part of more (virtually) centralised national object database.

9 February 2006

Memorandum by the Heritage Lottery Fund

ABOUT THE HERITAGE LOTTERY FUND

HLF is the UK's leading heritage funder, distributing the heritage share of National Lottery proceeds. It is the only heritage organisation that both operates UK-wide, and funds all types of heritage—including built heritage; museums, libraries and archives; natural heritage; industrial, maritime and transport heritage; and the heritage of language, dialect and cultural traditions.

HLF currently distributes 16.66 per cent of the money for good causes and since 1995 has committed £3.3 billion in 18,000 awards to heritage projects. The aims of the Fund are to:

- conserve and enhance the UK's diverse heritage;
- encourage more people to be involved in and make decisions about their heritage;
- ensure that everyone can learn about, have access to, and enjoy their heritage; and
- bring about a more equitable spread of our grants across the UK.

NATIONAL HERITAGE MEMORIAL FUND

The parent body for HLF is the National Heritage Memorial Fund (NHMF), set up by the National Heritage Act 1980 with wide powers to fund heritage throughout the UK in memory of people who have given their lives for the UK. The NHMF operates as a fund of last resort, saving items of national importance that would otherwise be lost. In its 25 years it has awarded £220 million for more than 1,200 projects.

SCIENCE IN THE WORK OF HLF

Science is important to the work of HLF in a number of ways. It routinely helps us and our applicants to determine the best course of action for the repair or conservation of a heritage asset; information technology helps people to experience and enjoy heritage both at sites and on the worldwide web; we are a major funder of the heritage of science, engineering and technology at sites and in our public collections; and many of our projects support the public understanding of science by enabling the public to participate in scientific activities.

Our approach to conservation is distinctive. We believe that understanding is a vital part of conservation and we therefore ask larger conservation projects to prepare a conservation management plan for their site or collection; this is a single document which brings together information from different scientific disciplines before key decisions are made about the future of the heritage. In addition, we support the costs of the investigations, scientific surveys and other specialist work necessary to plan a heritage project.

We also believe that conservation disciplines should collaborate. Many heritage projects involve more than one kind of heritage: for example, the restoration of a public park will often include work to historic structures as well as the landscape and biodiversity; and many museums, archives and libraries occupy heritage buildings. In such a situation, there can be competing priorities: for example, achieving the environmental conditions needed for the collection within a historic building. We therefore ask applicants to consider all aspects of the heritage in an integrated way.

FUNDING FOR CONSERVATION PROJECTS

Conserving and enhancing our heritage is one of HLF's three strategic aims and we are the largest funder of heritage conservation in the UK. Since 1994 we have invested over £1 billion in the conservation of more than 9,000 historic buildings. We have given £680 million to land and biodiversity projects and more than £1 billion to museums, libraries and archives, where many projects have included the conservation of nationally and internationally significant collections. Awards totalling £90 million have supported archaeological projects.

There is no other major funding source for the conservation of the United Kingdom's built and natural heritage. Without our continuing investment it would not be possible to conserve iconic heritage assets at risk, for future generations.

For example, major grants have enabled historic ships, including the *Mary Rose* (awarded £5.3 million), the *Cutty Sark* (£13 million) and the *SS Great Britain* (£8.8 million), to be restored, interpreted and opened up for the public. On a smaller scale, but still of national importance, a grant of almost £800,000 is helping to conserve and create access to the unique medieval Newport ship. Our grant of £9.2 million helped the British Film Institute to save the world's leading collection of early moving images, conserving more than 60 million feet of film, which would otherwise have been lost.

Two of these historic ships are good examples of the application of innovative technology in HLF projects.

The *SS Great Britain*, the world's first iron-hulled, steam-powered, screw-propeller ocean liner presents challenges for conservators as severe iron corrosion is endangering the very fabric which makes her unique. Conservators have constructed a glass "sea"—a horizontal glass plate—at the ship's water line to provide the roof of a giant airtight chamber surrounding the ship's lower hull. The environmental humidity beneath the glass plate is tightly controlled as Cardiff University researchers, working with the ship's curators, have calculated that by reducing the humidity to just below 20 per cent—roughly equivalent to levels in the Arizona desert—corrosion can be stopped. This technology has implications not only for conservators, but potentially in other areas such as contemporary ship and vehicle industries.

The *Cutty Sark* is the last surviving example of a clipper built for the China tea trade, and is one of only three surviving composite-built vessels—that is a vessel with a wrought iron frame to which teak and rock elm strakes were fastened. The wrought iron is actively corroding and long-time deterioration of the timber planking has also occurred. If the deterioration continues unchecked there is a real risk that the ship will disintegrate. Samples of the rot were analysed by Imperial College who identified the decay as electrochemical. Portsmouth Museum Service undertook an experiment to see if it would be possible to halt the corrosion on this composite vessel as previously had been possible on an all-steel vessel. Following the success of this experiment, the *Cutty Sark* conservation project will treat the frames and floors where the corrosion is severest by electrolysis.

It is unlikely that either of these major conservation projects could have gone ahead without funding from the Heritage Lottery Fund.

FUNDING FOR THE HERITAGE OF SCIENCE

HLF has also provided a significant level of support for the heritage of science, engineering and technology in the United Kingdom, both at heritage sites and in museums.

To March 2005 HLF had funded 990 projects in the industrial, maritime and transport heritage sector, totalling £590 million. Amongst other things, that funding has helped conserve 42 locomotives, 44 historic ships, 22 watermills and 29 windmills. We have also supported the repair of major pieces of technology such as the *Anderton Boatlift*. Industrial sites of international significance such as *Ironbridge* and *Blaenavon*, now recognised as World Heritage Sites, have benefited from HLF support to preserve them and make it possible for the public to visit and understand their importance to our heritage and economy.

We have also supported many of our museums of science and industry with an investment of over £154 million to date. We are helping to create the innovative *Darwin Centre II* at the Natural History Museum in London; we have supported all branches of the National Museum of Science and Industry, including the National Museum of Photography, Film and Television in Bradford and the National Railway Museum in York; and among smaller museums with specialist collections we have made awards to the *Rotunda*, a geological museum in Scarborough, the *Porthcurno Telegraph Museum* in Cornwall, and the *Hunterian Museum* at the Royal College of Surgeons as well as the three national mining museums of England, Scotland and Wales.

HLF is helping one of our most important scientific institutions, the Royal Institution, to restore and open up the row of four 18th-century townhouses which it has always occupied, to improve the storage of its significant collections, and to enhance public access to science research activity and the work of scientists. Our grants have also made possible enhanced public access to heritage sites associated with the work of scientists such as Down House, the home of Charles Darwin, and Edward Jenner's home, now a museum, in Gloucestershire.

FUNDING FOR SCIENCE AND TECHNOLOGY IN ENHANCING THE PUBLIC UNDERSTANDING OF AND ACCESS TO CULTURAL OBJECTS

One of HLF's three strategic aims is to ensure that everyone can have access to and learn about our diverse heritage. We have funded many projects which make innovative use of technology for access.

HLF is helping organisations overcome the barriers that prevent people with disabilities experiencing heritage sites and museums. We have funded a virtual reality tour of Anne Hathaway's cottage in Stratford-on-Avon, a timber-framed thatched cottage which is largely inaccessible to people with limited mobility, and at Tyne and Wear Museums we funded a project to create hand-held visual guides for people who have a hearing impairment, where information is presented in British Sign Language.

Digitisation of documents in our heritage collections is greatly improving public access and reducing the need to handle rare and fragile original material. Hundreds of unique local newspapers have been preserved and made accessible by the Newsplan project; awards totalling more than £6 million have enabled The National Archives to put online seven million catalogue entries for documents in more than 400 different archives throughout the country; many community heritage projects have created web-based collections of photographs and other heritage material that local people value and want to share more widely.

HLF FUNDING FOR SKILLS IN SCIENCE AND CONSERVATION

In 2000 HLF carried out research which found serious gaps in a wide range of skills across all heritage areas. As well as shortages of heritage craft skills the research identified problems in skills development for conservators. As a result we put in place a number of initiatives including more encouragement for applicants to include skills apprenticeships and training for volunteers in projects and a requirement for projects over £1 million to have a training plan.

Recognising a growing lack of specialist heritage skilled workers, we launched a Training Bursary Scheme in 2004. To date we have awarded £7 million to 10 partnerships which will offer traditional training apprenticeships and work-based learning placements at heritage sites. For example, the Institute of Conservation will award 60 bursaries in a UK-wide scheme for object, textile and paper conservation; and the Institute of Field Archaeologists will offer 32 bursaries in archaeological skills including desk-based assessments, geophysical survey, human remains, artefact research and conservation. Hampshire County Council will offer 16 bursaries in traditional engineering conservation skills for road vehicles in collections, including steam-powered vehicles, cars, commercial vehicles and bikes.

FUNDING FOR PUBLIC INVOLVEMENT IN SCIENCE

One of our aims is to enable more people to participate in decisions about our heritage. We have funded a wide range of projects where people acquire the necessary skills and experience through scientific investigations of heritage.

The York Archaeological Trust is helping people to get involved in recording their local heritage, using geophysical equipment and historical sources, and experts are training the public in fieldwork, finds identification and conservation. At West Blyth the local community is studying the sea fishery, the health of the North Sea, the sand dune system and the sea defences. During National Insect Week, 180 primary school children from inner city Bradford are investigating insect life by doing fieldwork, helped by entomologists from the Royal Entomological Society and at Benjamin Franklin House in London a Student Science Centre will enable young people to re-create important experiments from Franklin's time in London.

CONCLUSION

The Heritage Lottery Fund's investment of more than £3.3 billion in the heritage of Britain has been underpinned by the scientific investigations required to plan and manage both large and small conservation projects and has funded major conservation projects that have employed new and innovative scientific techniques. In addition a not insignificant share of this investment has ensured that our scientific and

technological heritage will still exist for present and future generations to enjoy. The Government is currently consulting on the future shares of Lottery income for the good causes; it is vital that we at least maintain our share in order to continue to support conservation and public involvement at this level.

13 February 2006

Memorandum by Historic Royal Palaces

Historic Royal Palaces is the independent charity that looks after the Tower of London, Hampton Court Palace, the Banqueting House, Kensington Palace and Kew Palace. We help everyone explore the story of how monarchs and people have shaped society, in some of the greatest palaces ever built.

We receive no funding from the government or the Crown, so we depend on the support of our visitors, members, donors, volunteers and sponsors. The five palaces are owned by the Queen on behalf of the nation, and managed by us for the Secretary of State for Culture, Media and Sport.

We believe in four principles:

- Guardianship: giving these palaces a future as long and valuable as their past.
- Discovery: encouraging people to make links with their own lives and today's world.
- Showmanship: doing everything with panache.
- Independence: having our own point of view and finding new ways to do our work.

Conservation science underpins the work that Historic Royal Palaces does to conserve its historic buildings, collections and archaeological evidence; enabling these irreplaceable assets to be used safely today whilst maximising their survival for future generations to enjoy and learn from. Therefore, Historic Royal Palaces is pleased to provide this response to the House of Lords Select Committee on Science and Technology. We wish to make four recommendations, followed by supporting evidence.

RECOMMENDATIONS

- That the committee support the establishment of a secretariat to co-ordinate, define and guide a UK-wide strategy for conservation and science research and conservation science research funding for this.
- That a strong and ring-fenced national funding stream, residing in one of the UK research councils, should be established for science research in cultural heritage. An academic analogue status route for heritage organisations should be offered by all UK research councils.
- That dedicated and co-ordinated funding should be identified as a national priority to reach the potential for increasing public understanding of science in heritage and knowledge / appreciation of heritage, primarily through enhanced use of IT.
- Advocacy to the European Commission should be directed at encouraging increased funding for scientific research in cultural heritage.

SUMMARY OBSERVATIONS

- Informal co-ordination of conservation science research has resulted in a lack of clear research priorities. The potential for multi-disciplinary collaborations is not maximised. There is no central vehicle to publish research data or to co-ordinate dissemination.
- Funding is fragmentary, minimal and hard to get because conservation science is seen to fall between arts and sciences.
- The potential for use of information technology as a tool for enhancing public engagement has fallen behind because resources for this are limited and thus used for the core purpose of research analysis, rather than interpretation for public use.
- The conservation science profession has a responsibility to communicate and engage more effectively with the wider world about the outcomes and value of conservation science programmes, and the need for funding.

BACKGROUND:*Science and Heritage at Historic Royal Palaces (HRP)*

Science and technology has an important and growing role in achieving our aims. Historic Royal Palaces (HRP) manages world-significant heritage assets which carry important conservation responsibilities. We recognise the imperative to get things right in establishing a legacy of cared-for assets for future generations. We therefore need to do the best possible heritage management and conservation treatments, with cutting-edge applications for buildings and collections. For fragile heritage, our technical approach must be of the highest specification and able to support our values of preservation, (science) educational/learning developments, and sustainability (such as environmentally-friendly energy technology for heating buildings and managing the impact of climate change on potential flooding). HRP supports efforts for determining best practices worldwide through the heritage profession, both its developments and its contributions to managing heritage responsibly. Science underpins and guides all that we do in this guardianship work.

Historic Royal Palaces invests in conservation science on a continual albeit small-scale basis through our own charitable earnings, approximately £75k each year for the collections and variable amounts through capital scale conservation projects for the buildings, to address research needs identified as urgent. We contribute to intellectual and financial collaborations, combining small amounts of our conservation science resources across partnerships. For longitudinal and “blue skies” research we seek external funding at levels higher than our normal operating capability. Twice our research work increased under the European Commission (EC) Fifth Framework Programme (FP5) enabling a significant but demarcated step forward in our scientific research activities, and making them pan-European in scope (Fewer possibilities for similar EC funding exist under subsequent Framework Programmes).

In addition, HRP has benefited from collaboration with English Heritage, the National Trust and the University of East Anglia on a research project funded by the Leverhulme Trust into particulate pollution. Scientific research undertaken to further our knowledge of the buildings is generally carried out through external partnerships.

Priority is given to primary scientific research, and we recognise that this is best achieved through co-ordination and collaboration with other heritage organisations and universities, where knowledge and equipment can be pooled.

With the assets we manage, our conservation research remit at Historic Royal Palaces is necessarily wide-ranging. It is to:

- determine the true condition of collections and buildings through studying the technology and craftsmanship of manufacture;
- to understand the impact of use; and
- to mitigate the negative change caused by storage and display environments or unique inherent problems to the materials and their structures.

Within our Conservation Department, scientific work relating to the internationally-significant collections is carried out by a team of two conservation scientists directly, in a dedicated scientific laboratory at Hampton Court Palace, and indirectly using consultants as funds permit. There is a 25-year long and distinguished history of scientific heritage research at HRP: we were successful in winning the UK-wide Anna Plowden Award for Research and Innovation in Conservation in 2004, and were short listed again in 2005 (www.annaplowdentrust.org.uk).

AREAS OF INTEREST TO THE INQUIRY:*Co-ordination of conservation science between museums, universities and other organisations in the UK and internationally*

There is no national organisation or body to co-ordinate conservation science in the UK. Consequently, there is no national agreement about research priorities or data set archiving, strategic sharing of resources and expertise, provision of guidance on funding, etc. Thus research resources are diluted, efforts might be duplicated, opportunities for collaboration missed, and key research priorities misdirected.

Common research needs and challenges identified on an informal basis result in co-ordinated working, but this is subject to funding provisions and/or dependent on the support of heritage organisations for individual participants, which is inconsistent at best. An exception is, for example, the informal user groups which has

formed for those working in similar research areas, such as the international Infrared and Raman Users' Group (IRUG, www.irug.org).

Professional bodies currently exist to promote and foster collaboration within conservation science, specifically the Institute of Conservation Science (ICS, www.echn.net/ics-uk) and, more broadly within conservation, the Institute of Conservation (Icon, www.icon.org.uk). Internationally, professional co-ordination is achieved by the International Council of Museums Committee for Conservation (ICOM-CC, <http://icom-cc.icom.museum>) and in the USA by the Research and Technical Studies (RATS) subgroup of the American Institute for Conservation (AIC, <http://aic.stanford.edu>). These bodies facilitate dissemination and networking—at professional and academic conferences, seminars, meetings etc. English Heritage has recently issued a call for interest in developing a UK research strategy for the historic environment and its sustainable management, following the publication of its research strategy in 2005.

Organisations are generally self-sufficient in setting research priorities within the context of their needs, and guided through dialogue with colleagues. However UK conservation scientist posts are few and generally clustered in the national organisations, thus research needs of the heritage sector at large risk being represented incompletely. Moreover with so few conservation scientists there is a need to focus their time on researching local problems of some urgency, leaving little time to view the research horizon, search out new research partners, secure funding, let alone carry out research that is far reaching or “blue skies”, which can take years to complete, and rely on dispersed specialist analytical equipment and a breadth of expertise from external knowledge-based collaborations. A means for UK-wide co-ordination and strategy would ameliorate this fragmented situation which is working below potential.

Funding of conservation research

Conservation research is inadequately funded both at UK and international level (ie European). Funding is fragmentary and not generally accessible to those in the field.

There is virtually no funding of conservation science from MLA and the regional MLACs. The Heritage Lottery Fund excludes research from its terms of reference. Some funds are available through the AHRC, which created a research network to create the Textile Conservation and Textile Studies Centre, located at University of Southampton.

The provision for pan-European cultural heritage research has diminished throughout the FP6 and proposed FP7 programmes. This is a cause for concern both for the international profession, and for UK scientists in particular where no national source of ring-fenced funding for cultural heritage research exists.

Cultural heritage research had been well resourced through the Fifth Framework (FP5) programme of the European Commission, and HRP was a participant in two successful FP5 collaborative research projects.

Greater recognition of cultural heritage research through the ring-fencing of dedicated funds within a UK research council (AHRC or EPSRC) is highly desirable. At European level, advocacy should be directed at improving the funding potential of future Framework Programmes for cultural heritage science research.

In addition, the profession itself has an important responsibility to ensure that the need for funding is communicated more effectively, and to ensure that the outcomes of conservation programmes are understood and valued.

Cultural heritage research is a highly multidisciplinary applied science. As such, it often “falls through the gap” between arts and humanities (AHRC), and “purer” science (EPSRC) funding opportunities. A dedicated funding stream would mean that needs, rather than available funding, would determine research. This would greatly enhance the capability of the UK research community to respond proactively to the rising demands and potential for SET in cultural heritage.

Specific national cultural heritage funding programmes have been set up in several countries for scientific research with significant results. In the USA, the Mellon Foundation endows many conservation science positions and training placements. On a federal basis, the US National Science Fund has also had a defined funding stream for conservation science research. In Italy, the Progetto Finalizzato Beni Culturali of the Italian National Research Council was a 5-year programme for funding scientific and technological research into cultural heritage with huge impact. A similar scheme of dedicated funding would be beneficial in the UK to promote and facilitate scientific innovation applied to heritage issues.

A scoping study of externally funded research for conservation science being conducted by the University College London at this time has found that the 2005 UK spend by Research Councils on UK science research is £3 billion per annum of which only £450,000 (ie 0.015 per cent) has been awarded for UK conservation science research in 2005. By comparison Italy invested €40 million in five years for scientific research for cultural heritage.

Directing conservation research funding at the right areas

Inadequate funding steers priorities to where there is funding, which is not necessarily the true priority for the cultural heritage profession.

Expansion of the AHRC route for granting academic analogue status to heritage organisations would greatly facilitate end-user driven scientific research. The establishment of a national secretariat is required to ensure that national priorities are identified and strategically resourced.

Conservation science research is often co-ordinated or driven by universities because they can apply for UK research council funding. This situation may be transformed with the introduction by the AHRC of academic analogue status for suitable non-HE organisations carrying out research, and we would encourage the other UK research councils (eg EPSRC, NERC, ESRC and BBSRC) to follow suit.

The recent amalgamation of conservation groups into one organisation, the Institute of Conservation (ICON), and that of conservation scientists into the Institute of Conservation Scientists (ICS) will be step change in campaigning to influence others to increase financial support for conservation science research, but it still remains a relatively small sector. Government support would help make a case for funding bodies (such as research councils) to embrace conservation science research, making it part of their guidelines. Conservation science research was overlooked in the OST Science Review of DCMS, 2004.

UK capacity and skill base for maintaining cultural heritage for future generations

Nationally, posts for conservation scientists have decreased resulting in less capacity and concern for the future. Dedicated sources of national funding for cultural heritage research need to be directed as a priority by a national secretariat to build the next generation of conservation scientists.

The UK has an international reputation for excellence in this field—as evidenced by the high proportion of international conferences, seminars, and peer-reviewed journals originating from UK-based organisations and being partners in many EU Framework funded conservation science research projects. However, there are insufficient posts for new graduates. Combined with low pay expectation, the lack of capacity means that post-graduate and doctoral researchers “dip-in and out” of conservation science, which is inefficient in building a long-lasting skills base. Conservation scientists in established posts are concentrated in national organisations, thus creating a short one-rung career ladder. There is difficulty in retaining experienced and well-qualified scientists for the future of the profession.

As a general consequence of limited research posts and static funding, the UK no longer leads in conservation science research. This has put others in the lead, including Canada, America, Italy, Germany, France, Scandinavia or Japan.

Training is an important issue—the UK has long been a centre for training conservation professionals from around the world, however there are no dedicated university courses for scientific research in cultural heritage in the UK.

Application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation: the UK compared with other countries

UK conservation scientists (led by the National Gallery, London) have participated in the EU-ARTECH/MOLAB project (<http://www.eu-artech.org>), where mobile state-of-the-art analytical equipment is transported to art collections across Europe for non-destructive analysis and testing. MOLAB has been highly successful in promoting networking and cooperation in the analysis and scientific study of artworks across Europe. There is no such “body” in the UK to co-ordinate wider access to the analytical equipment located in national heritage institutions. To maximise existing use and capacity, co-ordination is required of staff to use existing analytical equipment, and to facilitate use by others (all of which is of a specialist nature).

The active collaborations between universities and cultural heritage organisations which have been promoted through EC and UK research council funding to date have encouraged innovation and the application of new technologies which have originally been developed for other industries. For example, cutting-edge surface

analysis and imaging techniques (such as secondary ion mass spectroscopy, SIMS and x-ray photoelectron spectroscopy, XPS), which were developed primarily for the semi-conductor and electronics industry, have been applied to the study of surface sensitive degradation phenomena in a wide range of ancient materials, from metals to textiles and plastics.

There is a lag between development and application, as funds needed to test field applications of cutting edge monitoring equipment and interpretation of the results are usually not in place. Such start and stop developments means that useful analytical tools infrequently meet their potential in application. End users are only those with sufficient in house scientific expertise, which in the UK are generally only within the large national institutions.

Practical applications of conservation research for the market

The stage of research and development required to produce a working prototype is generally resourced through existing EC and UK funding. However, the further development required from prototype to market is less well developed, both from a financial and strategic standpoint, and requires expert skills and resources.

More support for SME's (Small and Medium Enterprises) would facilitate the process of taking a research application from prototype to market. The main market for such tools remains the heritage market.

As a relatively small market, cultural heritage is becoming more aware of other potential (larger) markets for commercial products developed as a result of scientific research. A good example is in the growing number of innovative sensors or dosimeters which have been developed to monitor environmental conditions and resulting impact on sensitive heritage collections. These may also have applications in hospitals, clean room technology etc.

However, conservation science should perhaps be seen as a money saver more than a money maker. The preventive conservation care measures devised from conservation science research, for example, reduce the need for cycles of costly interventive treatment repairs in the long term. This reduces capital costs. Additionally conservation science has potential to contribute to market processes through the learning market, rather than the commercial market.

Making better use of conservation science and information technology to improve public engagement with and understanding of science and technology, and the part they play in cultural heritage

There is a barely tapped potential for conservation science to make accessible all learning agendas for science at a variety of levels, from schools to life-long learning. Within the heritage field, information technology is well established as part of research, but not as a tool for dissemination.

A defined funding stream for cultural heritage is required to reach the potential for the use of conservation science and IT in increasing wider understanding of science in heritage. A national Secretariat would enable resources to be targeted towards utilising cutting-edge IT-based technology to promote public engagement, as a UK-wide priority.

Scientific research enriches our understanding, and ownership, of our cultural heritage. At HRP, discovery (ie learning) is a cornerstone of all our work—and we recognise the “added value” of science in learning and educative potential. The often-forensic approach of conservation science results in fascinating stories about collections, buildings and materials, which can entice visitors to become interested in science at a young age. Visually accessible concepts can be understood via demonstration in understanding how objects are made, and what happens to them as time passes.

HRP promotes technological research in making associations with craftsmanship, and through science building links from past—to present—to future. For example, we have used 3D laser scanning, imaging and modelling as a unique tool for exploring historic sculpture and other significant textured surfaces (such as graffiti) with our visitors, which otherwise may be inaccessible for practical or conservation reasons. In this way, scientific technology is liberated from the laboratory and forms an integral and exciting part of the visitor experience.

Conservation and conservation science has already been used as the foundation for several successful international exhibitions at major institutions. For example:

- Rijksmuseum Twenthe, in Enschede, Netherlands, “The Art of Conservation” exhibition, October 2003—January 2004.

- National Gallery, London: “Art in the Making: Underdrawings in Renaissance Paintings” exhibition, October 2002—February 2003 (sponsored by Glaxo-Smithkline) and ongoing audio tour (www.nationalgallery.org.uk/collection/tours/artinthemaking).
- Liverpool Museums Conservation Centre, permanent exhibition (www.liverpoolmuseums.org.uk).

It is vital to the future of the profession that conservation scientists in all heritage organisations are passionately committed to public communication or engagement as a core part of their mission.

The Victoria and Albert Museum have launched an innovative programme which uses Podcasts as a medium for curators and conservators to tell stories to the public about paintings, their technology and preservation (V&A, www.everyobject.net/interactive). This type of scheme could also be expanded to include hand-held personal computer and mobile phone technology available on-site at a heritage institution, in addition to being available for download at home from the internet. For example, the Natural History Museum has introduced hand-held multi-media personal architectural tours for visitors (NHM, www.nhm.ac.uk/visit-us/whats-on/events).

The internet and use of websites to make collections accessible online can target non-traditional audiences. More digitisation of collections for on-line access should be supported. Innovative technologies such as those listed above could be used to help visitors explore their relationship with history in a personal and meaningful way. The use of webcams could have an advocacy role in following and explaining conservation projects to the wider world.

State-of-the art imaging and multi-media projection systems can simultaneously provide exciting tools for both scientific discovery and interpretation to the public. For example, the “Mummy: The Inside Story” exhibition at The British Museum (July 2004—January 2005) used medical scanning and computerised imaging technology to reveal the internal structure and contents of an Egyptian mummy without the need for destructive unwrapping. The fascinating images were used to produce an extremely popular 3D “theatre-style” presentation to accompany an exhibition (BM, www.thebritishmuseum.ac.uk)

13 February 2006

Memorandum by Mr Richard Hughes

BACKGROUND

1. I am a consultant conserving historic buildings and structural archaeological remains above and below ground. I have worked in these fields for the last 30 years undertaking major conservation projects in the UK and in the Middle East, SE Asia and Central Asia.
2. In the UK I have worked on Scheduled Ancient Monuments and Listed Buildings and on structural archaeological remains found on development sites where there has been a requirement for their *in situ* preservation. I consider that I am at the forefront of instrumenting urban archaeological sites for determining the “drivers” of soil preservation conditions. I have a special interest in the conservation of soil buildings and in the performance and repair of historic buildings that may be or have been earthquake damaged.
3. Overseas, many of my commissions have been for UNESCO and the Aga Khan Trust for Culture. A large number of my projects have been on World Heritage Sites.
4. I have conserved numerous historic buildings in the Northern Areas of Pakistan and for this work my Aga Khan team and I have been honoured with four UNESCO conservation awards and two international awards from British Airways related to conservation and sustainable tourism development.
5. I was responsible for designing the research and conservation programme at Moenjodaro including the implementing of the site laboratory. I have just completed a review of the conservation programme and the laboratory research activities at Lahore Fort.
6. I am presently a member of UK-ICOMOS International Committee and Earthen Building Committee. I am a member of the Corporation of London’s Planning Users Advisor Committee representing heritage interests. I have also participated in research projects with English Heritage, the Getty Foundation and ICCROM.
7. My evidence will relate to the application of science, engineering and technology (SET) to historic buildings/structures, structural archaeological remains (buried or not) and archaeological sites. I will mostly focus on international aspects, as I appreciate there will be a lot of submitted evidence related to more purely UK conservation considerations.

How is conservation science, in the UK and internationally, co-ordinated and undertaken?

8. World-wide SET is principally co-ordinated and executed by national and regional governmental departments and many academic institutions have their own and participate in exchange programmes. Here, English Heritage, Cadw-Welsh Historic Monuments, Historic Scotland and Northern Ireland Department of the Environment significantly represent government interests in the UK. Such organisations and practitioners have good linkages, given the small size of the conservation community and shared specialist interests. SET is not much driven by owners and Local Planning Authorities charged with protection of assets. The same government and academic roles apply in all the countries in which I have worked. In an overseas context, I note the significant contribution made by the Norwegian Government to furthering conservation in many developing countries.

9. In the UK, some useful SET contributions have resulted from National Trust, Church Commissioners, Environment Agency and the Highways Agency. CIRIA commissions address conservation and have recently issued a technical report on façade retention. In the past the Building Research Establishment (BRE) and other government funded bodies including Tropical Pest Institute have supported conservation objectives overseas. I still find the BRE Overseas Building Notes a useful source of technical information. The Timber Research and Development Association (TRADA) is a very supportive organisation regarding timber in historic buildings.

10. UNESCO and ICOMOS promote SET, but themselves have no in-house research and implementation capabilities. These, along with the European Union (EU, see below), are the main international organisations co-ordinating conservation science known to me. ICCROM, while being an important training establishment, also has an in-house laboratory and research programme.

11. The EU has been increasingly funding SET and the 6th Framework programme has supported a rich variety of projects. Many of these were well described and displayed at the European Commission Conference on Sustaining Europe's Cultural Heritage (from Research to Policy) held at Westminster, September 2004. The EU 7th Framework agenda is presently being determined and is aiming to address an exceptional spectrum of environmental technology topics. It has a special focus on supporting SETs where these provide valuable support for social and economic development.

12. The Getty Foundation supports, co-ordinates and participates in SET on the international scene and has in-house staff and facilities for laboratory research. In the Middle East there are some property owners who are actively conserving their personal major historic building assets, though commonly adhering to standard "rebuilding" approaches and thus not necessitating much SET.

13. In the UK, SET development is significantly supported by commercial companies (for example, engineers and environmental companies) carrying out conservation—which is essential for the commission in hand and which also provides future commercial advantage while supporting societal advancement.

14. In developing countries there is a growing tendency for SET by specialist NGOs and interest groups in the absence of official capabilities and sometimes, their non existing interest in cultural concerns. I consider the Aga Khan Trust for Culture to be one of the most successful and prestigious of the NGOs. Another specialist interest group operating from here with which I am familiar is the Egyptian Exploration Society. It is to be applauded for its approach of "no excavation without conservation" and where SET also importantly aids with analysing and interpreting the excavated resources. The several British Schools of Archaeology share these increasingly common approaches.

15. Conservation is often forced upon archaeological artefact laboratories which are given responsibility for buildings and sites. Overall, rarely is SET undertaken by the property owner. However it sometimes is by the occupier, concerned with control of maintenance and possible breaches of legal obligations thus, where scientific evidence supports an argument.

16. Often, the ethics of minimal intervention is used as an excuse to do nothing and certainly does support SET objectives.

17. Also, SET is seen as an instrument to force action which cannot initially be prescribed/programmed, but which can be ongoing and costly and thus, should be avoided. For example, instrumentation of a site aims to monitor future change of a defined parameter rather than being a tool of immediate action—for damage limitation and for example resolving defects.

Is conservation research adequately funded, and is it directed at the right areas?

18. For the needs of the UK the answer, I believe, is generally yes. This is evidenced by our respected capabilities. I do not know of any significant losses attributed to bad or inappropriate SET. However, it generally comes too late for monuments at risk. Policies and management are often the weak link and projects are often too driven by architects and their well-tested specifications. However, they often do not see the need for, or have the skills for, the application of appropriate SET.

19. In the UK we recognise that good science and technology does not need an overly sophisticated approach—we are well-known for “kitchen sink” science. One “gap” of particular concern to me is in funding research of urban soils, particularly of the roles they play in the preservation of structural remains and artefacts. While national and local policies support *in situ* preservation of archaeological remains development activities may be adversely affecting site conditions.

20. In many developing countries SET is significantly under-funded, both in-country and from overseas sources. SET has a very low priority and has to compete for valuable developmental resources. It is generally not appreciated that SET plays a role in income generation from tourism and that conservation can contribute to better and more durable modern housing, to “appropriateness” of new religious and cultural buildings and to better health. It is not uncommon to find some “misapplication” of funding. It is sad to note the gradual demise of the British Council and UK Government support related to the conservation of historic buildings and archaeological sites overseas.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage and to assist in its conservation?

21. The UK is one of the leading countries for conservation, with a mature appreciation of the scale and appropriateness of science and technology inputs—not treating it as a “trendy” subject. Thoroughness is of key importance. Simple solutions and completed work are normally regarded as better for the building/ruin than an experimental action which might hit newspaper headlines but later need many additional actions.

22. I also consider that the application of SET to conservation objectives is also making a positive contribution to the better performance of modern buildings.

Is there a satisfactory process to develop practical applications of conservation research for the market?

23. In the UK and internationally there is no shortage of debate. There are many specialist meetings and more general conferences that address present and future conservation processes and methods. In the UK there are just about a reasonable number of practical courses teaching conservation methods. But, I do not believe they are geared enough to scientific research and its practical application. I also find there is a gap between the cutting-edge academic research, training and developing of application methods. I believe this can somewhat be seen in lack of dissemination and uptake of research findings from the EU 6th Framework conservation related projects.

24. There is a large range of innovative projects both here and abroad, but run from here. The success of these supports my view that there are, for the established conservation practitioner, satisfactory practical application transfer mechanisms of SET.

25. Each project is a one-off in terms of problems, investigation techniques and solutions. Often, the weak link in projects relates to design and programming. Many practitioners agree that we cannot be too cutting-edge as solutions are for the long-term and cannot: (a) be used for a quick fix; and, (b) when innovative be tested—risks can be too high when solutions are experimental. It is worth while remembering that modern buildings are designed for a short life, whereas conservation aims to support retention of authentic structure and materials for hundreds of years. This involves building scientists and engineers having different perspectives.

26. I consider that it would be appropriate for there being more exchange programmes between colleagues—in the absence of there being many ways to disseminate information to developing countries. Often, I find that literature is not the best way to disseminate information and aid in the design and application of new techniques there. Hands-on training is essential and must be repetitive. This requires there being long term training and research commitments. I have found that it is hard for some people to translate scientific results derived elsewhere into practical conservation actions for their own projects.

27. I consider that there is a need for far more training of conservation SET for architects, engineers, material scientists and archaeologists. Conservation, as a broad based subject, not just related to SET, should better be addressed in undergraduate and post-graduate studies and for young professionals striving for chartered status. I consider there to be too few specialist conservation courses in the UK.

28. There is a need for more materials testing houses to provide training in the application of their methods related to conservation objectives.

How is Information Technology being used?

29. In the UK, project and SET documentation—both traditional and modern—are rigorous and achieve excellent standards and are generally available to the public at dedicated archives and libraries (including those of Local Authorities). Increasingly, there are computer mechanisms for obtaining data. For example, from English Heritage and RCHME. There are well considered guidelines and form of specifications that are straightforward to use. These generally establish methods and standards but do not particularly addressing innovative applications of IT.

30. Of growing concern at home and abroad, is the use of digital format documents, long-term archiving/ accessing and digital information durability. For example, Black and White negatives and prints only have a long-term track record of durability yet most projects use colour prints and computer paper drawings. On projects abroad, I find it increasingly difficult to find and access computer systems storing AutoCAD drawings and photographs and this relates to the lack of conservation/archive training given to the computer operators. Securely housed “backups” are rarely made and when done, the storage does not meet international environmental storage conditions.

31. Computer technology has and will continue to significantly aid conservation with access to technical literature and ICOMOS, ICCROM, Museums Libraries and Archive Council and SPAB, for example, have useful web sites for sharing literature and driving conservation objectives.

32. Within the countries that I work I rarely see modern IT and ICT being used in museums related to access, display and understanding of cultural objects. This, I think, is related to the required investment time, costs and skills. The most recent trends are for static 35mm slide and DVD shows, but even these require a secure electricity supply and on-going technical support.

33. ICT outputs, especially 3D computer modelling of buildings and archaeological sites, are of increasing value as design and analytical tool and for illustrative interpretation to the general public, as seen in a range of popular television heritage and archaeological programmes.

GENERAL SUPPORTING OBSERVATIONS AND EVIDENCE

34. I consider that good conservation is as much an art as a science and that there is no substitute for experience and apprenticeship. At the present time there is a significant shortage of skilled craft-persons in the UK. The Conservator and Contractors List, issued by the War Memorial Trust, provides a good indicator as to the health of the industry. It is a great pity that the training workshops held by English Heritage at Fort Brockhurst no longer occur. Some training workshops that are known to me occur at West Dean College, the Lime Centre, SPAB and the University of Bath. The Centre for Archaeology run by English Heritage at Fort Cumberland incorporates the Ancient Monuments Laboratory. In respect of SET, the inquiring mind of a forensic conservator will usually find a person who can answer specific technical concerns, thus not needing to resort to sophisticated new research for obtaining the best, or the least harmful, conservation solution.

35. One of the main conservation training centres is the King’s Manor, York University. This has consistently attracted overseas students. However, fees are high and I notice a growing trend for a training preference in Rome (ICCROM) and the University of Leuven. The Pakistan Institute of Archaeological Training and Research (PIATR) at Lahore, set up by the Department of Archaeology of the Federal Government in 1988 with great encouragement of Sir Bernard Feilden, with the expectation of attracting building conservation orientated students from Central Asia, Middle East and SE Asia, has proved not financially and technically sustainable.

36. Despite “local” initiatives, overall, I perceive there to be a growing gap between conservation requirements, the needs to meet ever increasingly stringent, legal, innovative and technical requirements and the overall number of conservation practitioners. I perceive a growing requirement for appropriately trained structural archaeologists, building scientists and engineers (especially M&E engineers).

37. Buildings and archaeological sites normally superbly illustrate their problems. Indeed, most archaeological sites represent the self burial of decay and collapse processes. Identifying problems and causes is three quarters of the way to prescribing conservation methods and thereafter, cutting-edge SET is not required.

38. “Micro’ forensic sciences developed and used in the UK are fully applicable abroad, given that world-wide, we have common material decay and structural stress phenomena. Some processes are far more aggressive elsewhere, for example with temperature, humidity and rainfall extremes, termite and attack by other biological vectors. Dealing with such hostile conditions is more a technological art than a forensic science.

39. Based on my experience most interventions, following treatment of the cause, can be classed in two ways:

- Like-for-like replacement where there has been severe decay and structural distress. Most interventions here require good quality craft skills and ensuring that the same problems do not reoccur.
- Stabilisation/consolidation *in situ* where there is slight to moderate decay and distress and it is here that cutting edge SET is most applicable.

40. Where SET is applicable the UK it is at the cutting-edge and where we are active abroad we, are highly respected and in demand. To illustrate this, many well-known people have been active abroad including Plenderleith, Goudie, Ashurst and Feilden to name but a few. This continues through the various activities supported by UK ICOMOS.

41. Some key SET areas that I am familiar with or actively involved in are:

- Structural Timber*. Examples include the works of Brian Ridout, Peter Ross and Andrew Lawrence.
- Stone*. Examples include the work of Dr Clifford Price at the Institute of Archaeology, London and Dr Andrea Hamilton at the University of Edinburgh.
- Structural Soil. Examples include my own work on density relaxation and small strain effects on fabric, and soil stabilisation.
- Cast and Wrought Iron*. Examples include stitching (of Battersea Bridge) and use of carbon fibre bonding.
- Mosaic Pavements. The work of John Stewart in the UK and Eastern Mediterranean countries on in situ conservation and “lifting”.
- Lime-Based Mortars and good examples include: the English Heritage Smeaton Project; the field trials of the National Trust; and, the practical training days of the Society for the Protection of Ancient Buildings (SPAB).
- Structural Performance and Deformation “Modelling”, especially of decay and new impacts including bombs, tunnelling and fire. Examples where this has occurred include: the Big Ben Tower; Leaning Tower of Pisa, King’s Cross Station.
- Archaeological Sites: John Fidler of conserving excavated sites, the technical supporting services English Heritage scientific officers and the English Heritage’s Monument Protection Programme.
- Environmental Control especially where there is a building new use or integration of archaeological remains within a development. An example of this is at the Merrill Lynch European Headquarters, City of London, where the Roman City wall and a Mediaeval Bastion are within a new viewing chamber with controlled microclimatic conditions.
- Geotechnics, for example differential foundation movement due to swelling and shrinking soils.
- Remote Sensing, especially the application of innovative laser scanning, photogrammetry, thermography and ground penetrating radar for surveying and analysing standing buildings and resistivity magnetometer and ground penetrating radar for archaeological sites. In recent years many of the advancements have resulted from software development.
- Seismic Performance and Building Retrofitting, examples including the work of Arup in America, New Zealand and Turkey.

42. Thus, for me, it is perhaps with the structural components and whole structures where I see most new forensic science and technology occurring. I believe that this is not so much the case with SET and architectural finishes. However, this recognises a need for building “stability” to ensure that authentic finishes are protected. I have noted increased amounts of paint analysis on historic buildings, for example, using XRD and high magnification microscopy. These have been recently used on the Listed Gasholders at King’s Cross Station.

I have not seen this occurring in developing countries, probably due more to cost and the location of analytical equipment, than lack of capability and desire.

43. As with many SET subjects, advancements are sometime sudden but are also often slow. This is a result of many factors including trends promoted by heritage charters, conservation fashions, and “transferred” techniques via new equipment developed for other purposes. At the moment, I believe that those subjects marked with * are well understood, where research and experimentation is slow/on-going and where the results are not significantly revolutionary and changing the technology of conservation.

44. As buildings and remains are their own laboratory and illustrate adequacy of design, performance and cause of defect, there is often no need for costly scientific processes and where there can be several concerns:

- Scale and right type of investigation and thus validity/applicability of results—“an electron microscope slide of pore salt when the whole building falling over”.
- Living in the real world—most old buildings do not lend themselves to mathematical analysis with numerical modelling techniques developed for modern engineered structures.

45. Some key SET themes that I think will be of future importance include:

- Earthquake protection and retrofitting in pre and post-disaster situations.
- The preservation of urban soils (and contained structural remains).
- Control and treatment of insects and other micro-organisms (termites and bacteria, for example).
- Effects and control of rising and lowering ground water.
- Effects and control of (changing) climatic extremes.
- Identification and mapping of geo-hazards in historic landscapes.
- Numerical predictive modelling of structural deformation due to tunneling and the excavation of deep basements.
- Coastal and riverbank erosion.
- The application of GIS in conservation.
- The application of high resolution remote sensing in conservation.
- International documentation standards and archiving.
- Technologies for relocating buildings and façade retention.
- Measuring the effects of development processes on archaeological and structural historic remains.
- Change of archaeological preservation status away from new motorways and railways.

46. In developing countries, of greatest value will be the continued application of well-tested SET—rather than innovative, untested approaches. This reflects on the skill-base and funds available. Some SET transferred from UK etc dates back many decades and is highly appropriate and a “best-fit” for the situation. Long term “desires” have proved not sustainable for many reasons:

- Poor training or good training and leakage to better paid employment.
- Poor equipment or equipment that cannot be used.
- People with appropriate skills seeking more lucrative employment.
- Setting of non achievable technical goals and with a mismatch to key conservation and heritage requirements.

47. Generally, abroad and especially in developing countries conservation involvement by citizens of the UK comes about because of:

- Personal initiatives and support to special interest societies.
- Family and friendship linkages.
- Additions to job commitments.
- Linkage forged with academic institutions and NGOs.
- Consultancy work for UNESCO and other agencies promoting conservation.
- Commissions for banks including the World Bank and the Asian Development Bank.

48. For many in my industry gaining employment, purely from conservation projects and professional commissions overseas, result mainly from linkages with organisations including UNESCO, ICOMOS and World Monument Fund. However, these generally provide short term SET consultancy commissions. Most work is generally awarded to senior consultants with a steady income at home and often the work does not

provide a good living salary for others. This usually does not allow for continuity and sustainable involvement and a means by which young professionals gain experience. The reliance on the use of many consultants on a single project (a quick in-and-out approach) has in the past disrupted the application of well informed science and technology, often with the consultants having been taken out of the context of their past expertise. I consider this approach significantly inhibits the application of best-practice innovative SET.

49. I am not familiar with many cases in developing countries where conservation projects have been awarded as a result of competitive tendering. Usually, I see awards made solely on the basis of the cheapest bid wins, thus inhibiting the prescription of SET objectives. My understanding is that UK technical and management aspects of new job submissions for overseas work are generally of a very high technical quality but that we look too expensive (and often too good and a threat).

50. Of particular note are conservation campaigns in the Northern Areas of Pakistan and in Peru where SET applied to conservation of buildings and archaeological sites is a significant catalyst for rural development, providing both appropriate methods and a catalyst for societal involvement.

51. In the developed world, the application of conservation SET for structural archaeological remains and archaeological sites is in its infancy. In the past, the assumption has been that if it is buried and cannot be seen it is adequately surviving. This model is being challenged as a result of there being environmental changes including ground water lowering, river floodplain protection and the construction of deeply penetrating foundations and basements. The UK is one of a handful of countries striving to achieve research programmes for long term in situ conservation and preservation objectives. I predicted that the EU will be supporting this subject more in future. No major research projects are known to me on this topic in the developing countries in which I work or am familiar with. English Heritage has just set a five year research plan including goals for research for achieving *in situ* preservation and providing technical advice to the conservation community, Local Authorities and developers. English Heritage is involved in several field experimental programmes, based in rural settings examining preservation conditions and has a simple but important ground monitoring programme related to the Rose Theatre site in Southwark. In the urban environment I have been instrumental in setting up fuller scientific programmes for determining and assessing “drivers” of decay-preservation in the urban environment. My experimental sites include: Whitefriars, London Millennium Footbridge, Park Road Croydon, Ludgate West and Shrewsbury. On all these sites the application of SET has been “developer funded”, in line with recommendations of PPG16 and satisfying Planning Conditions.

52. In our work both here and abroad, we are considering the use of WebCams on sites for computer access real-time viewing, for a general audience and with dedicated links to museums and schools, as a means of outreach and public engagement.

53. Increasingly, information transfer is by “Living History” approaches and many events are held each year in the UK supported by web linkages. For example, there is a plethora of weekend re-enactments sponsored by English Heritage, the Sacred Knot Society, and other specialist societies. The same trend is seen abroad, for example, the Silk Route Festival where events are held in conserved historic buildings. Other public participatory events are hosted by Weald and Downland, Chiltern and St. Fagan’s open air museums and by the National Trust.

54. A few years ago the UK hosted Commonwealth commemorative events over many months, promoting “intangible” cultural attributes, a subject not being addressed by the House of Lords Inquiry but of considerable importance and facing many similar threats as is the built historic environment.

Memorandum by the Institution of Electrical Engineers

1. The Institution of Electrical Engineers (The IEE) is the largest engineering institution in Europe with a membership of some 120,000 professional engineers who represent key sectors including electronics, communications, computing, energy, manufacturing, and transport. Many of our members are also interested in the history of technology and some are directly involved in the preservation of our heritage. The IEE Archives, co-located with our library at Savoy Place, contain a range of historical collections on science, engineering and technology, as well as preserving the archival records of the Institution’s 130-year history. Information on our collections can be found on our website²; alternatively visitors can view original material in our supervised reading room.

2. We have provided evidence in particular on the use of digital and analogue recording systems to preserve material. Whilst it is very straightforward to use many IT media as short term data retention sources, long term data preservation presents an entirely different problem. The rate at which IT storage media and their playback systems become obsolete is a cause for concern and for preservation and heritage purposes it is not

² <http://www.iee.org/TheIEE/Research/Archives/>

sufficient just to leave the data “in a black box in the corner”. We stress the need for preservation plans to include policies to protect digital and analogue records against technological obsolescence.

3. We have also identified a number of techniques for the analysis and display of artefacts that have been made possible by the emergence of powerful information and communication technologies. These techniques include:

- Remote displays using holograms.
- Advances in technology that enable modern replay equipment to retrieve more information than was possible at the time of recording.
- Advances in non-intrusive imaging and modelling techniques that enable the virtual reconstruction and visualisation of an artefact in every conceivable detail.

4. We have also suggested that an international review of UK’s research and innovation performance in science and heritage should be carried out to provide a baseline for future investment.

5. Our heritage plays a major role in the education and development of children and young people, and communities, as well as making a significant contribution to the economy. The UK is making good use of innovative science and technologies not only to improve our knowledge base but also to widen access. Government must recognise these contributions in its spending review and must continue to fund the development of those sciences and technologies that protect the historic environment.

6. Our evidence is set out in Appendix 1 and reflects the views of our senior archivist, together with contributions from our members in UK and abroad.

February 2006

Appendix 1

CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

1. The private sector, including businesses and charities, is an important stakeholder in the preservation of the UK’s heritage. Unfortunately, it is often overlooked in the co-ordination of conservation efforts and the application of national standards.

2. In addition, privately owned historic property does not enjoy the same tax status as charities, or the government funding that supports English Heritage. Furthermore, private owners are not eligible for Lottery or European grants for building repairs or maintenance. These examples of differing fiscal arrangements suggest more needs to be done to encourage co-ordination and co-operation.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

3. Preservation of the built environment requires people with manual skills such as stone masonry, thatching, wood carving, dry stone walling, frieze restoration, gold leafing and hedge laying. However, there is a shortage of skilled workers which is threatening the upkeep of historic buildings and artefacts. We therefore welcome the commitment to training being made through the Heritage Lottery Fund Training Bursary Scheme but it is important that this level of commitment is sustained over the longer term.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

4. We have no direct evidence on this issue but RAE 2001, and a 2004 report published by the National Museums Directors’ Conference (NMDC)³ provide some clues.

5. Unit of Assessment 60 under RAE 2001 covered the history of art, architecture and design which seems to be the closest subject alignment. Only one Higher Education Establishment was awarded 5 * compared to three in 1996. This suggests that there is room for improvement and that the Committee may wish to undertake a further review once the results of RAE 2008 are published.

³ <http://www.nationalmuseums.org.uk/images/publications/creative—engagement—textonly.pdf>

6. The NMDC report covered the exploitation of new technologies including laser cleaning, digital imaging, and the protection and monitoring of the condition of art in transit, but none of these is particularly cutting-edge.

7. It also seems that conservation science involves a number of research councils, not least EPSRC, ESRC and the AHRC. EPSRC has developed a successful programme of international reviews of UK science that act as one of the inputs to its investment strategy. Whilst we may be confident that some of our science and technology is cutting-edge, an international review of conservation science would provide a benchmark, identify national strengths and weaknesses, and inform future investment decisions. In the meantime, there may be merit in bringing together the academic and applications communities to undertake a national review; the IEE would be pleased to facilitate this activity.

Is there a satisfactory process to develop practical applications of conservation research for the market?

8. Our proposal for an international review of conservation science should include the practical applications of research. In addition, knowledge transfer networks play an important role in sharing best practice. Such a network may already exist within the heritage sector but, if not, then this would be a valuable addition to the UK's heritage programme.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

9. Science, engineering and technology (SET) has played a vital role in the development of modern society and many buildings and artefacts are significant because of their scientific and technical history. These collections present specific issues in terms of conservation: technical records may require specialist interpretation; artefacts are often large and in need of restoration; and buildings are neglected. Modern records of scientific development have their own problems in terms of the preservation of digital content. SET therefore has a role to play in preserving its own heritage as well as the overall cultural heritage of the UK.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

10. Digitisation has been used successfully to reproduce images of artefacts which are accessible via the Internet or CD-ROM. One prominent example is the British Library *Turning the Pages* project⁴, which enables readers to read a manuscript book or roll on screen. IT can also be used to record and communicate metadata on collections, from catalogue records to information on digitised images. Users can therefore retrieve information on the history and context of the item they are viewing, as well as information on its physical form.

11. There are however significant issues that need to be considered when using digital and analogue recording systems to preserve material. Whilst it is very straightforward to use many IT media as short term data retention sources, long term data preservation presents an entirely different problem. The rate at which IT storage media and their playback systems become obsolete is a cause for concern and for preservation and heritage purposes it is not sufficient just to leave the data "in a black box in the corner". Unlike for instance written material, the quality of digitally preserved material can only be established by playing back that material. Care must be taken because this in itself might damage the material.

12. It is also essential that heritage managers are aware of when media and playback systems are likely to become obsolete and make arrangements for data to be transferred to an alternative. Preservation plans need to include policies to protect digital records against technological obsolescence. Digital records are hardware and software dependent, potentially leaving the content unreadable when the systems originally used to create and read them are no longer in use. Common examples of obsolete storage media include 8-track tapes, 5 inch diskettes, and files created in software formats not migrated or converted to newer readable versions. Questions that need to be addressed include: will you be able to open a file created in a proprietary software format in two, five or 10 year's time, or read the DVD to which your data is stored? Keeping digital records requires careful attention to migration/conversion through the record's life-cycle ensuring readability over time. Even if a digital version is readable, the extent to which it is accepted as reliable and authentic evidence will depend on the availability of system documentation detailing the creation, maintenance and ongoing management of the records over time.

⁴ <http://www.bl.uk/onlinegallery/ttp/tpbooks.html>

13. There are also a number techniques for the analysis and display of heritage of all types that have been made possible by the availability of powerful information and communication technologies such as:

- (a) **Remote Displays:** Many museums have made holograms of valuable articles in their collections, both for insurance purposes and to check for deterioration. In Russia (for example) exhibitions of holograms of national treasures are sent to remote areas, enabling people to see and appreciate their national heritage without the necessity of travelling to major museums.
- (b) **Audio Recovery:** Our evidence on the use of digital media is set out above but there is equal concern about our audio heritage. Due to the limited lifetime of carriers and hardware, the safeguarding of the audio heritage can only be achieved by copying the recorded contents from old to new carriers. However, this process can have benefits in its own right because advances in technology of analogue recordings often enable modern replay equipment to retrieve more information from the carriers than was possible at the time of recording.
- (c) **Visualisation and Virtual Reality:** The combination of modern measurements, two and three dimensional imaging, photogrammetry (the method of making precise measurements from photographs) and mapping provides a field for the development of new ways to register and present information that enables the virtual reconstruction and visualisation of an artefact in every conceivable detail. Effective use of these techniques enable visitors to view two-dimensional images and utilize remote telerobotic devices (remote operation systems which mimic human movements through machinery) equipped with video cameras to view three-dimensional works and participate interactively, in real time, in art performances and installations. New techniques in 3D modelling, haptic interfacing (an interface with a computer through a tactile method involving a device that senses body movement, such as a dataglove), and augmented reality will permit onsite and remote inspection and manipulation of three-dimensional museum objects. The effect that such a reconstruction will have upon scientific research, dissemination of knowledge and public interest is profound.
- (d) **Analysis:** The technique of computerised axial tomography scanning (CT scans), when combined with a pertinent interpretation of the images obtained, is a powerful analytical tool which can provide proof of the inner state of an artefact. These operations reveal valuable information about the object's background such as how something was manufactured and assembled, what natural damage might have occurred and what repair or restoration might have been carried out.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

14. UK is at the forefront of many of the ICT developments listed above and there is considerable opportunity for UK galleries and museums to become "early adopters" making them attractive places for the study and display of the world's heritage. There are also examples of "best practice" that should be shared through a knowledge transfer network.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

15. *Connected Earth*⁵ is an extremely good example of the use of technology to solve a collections management issue (in this case, what to do with BT's instrument collections and museum).

Memorandum by the Museums Association

1. INTRODUCTION

1.1 The Museums Association (MA) is an independent membership organisation representing museums and galleries in the UK and people who work for them. The Association has over 5,000 individual members and 600 institutional members. These institutional members encompass around 1,500 museums in the UK ranging from the largest government-funded national museums to small volunteer-run charitable trust museums. Formed in 1889, it is a charity, receiving no regular government funding, which seeks to inform, represent and develop museums and people who work for them in order that they may provide a better service to society and the public.

1.2 We welcome the Committee's decision to investigate this area. In general we consider that the potential applications of science and technology to the preservation and interpretation of heritage are underdeveloped. The detail of these issues is largely outside our area of expertise and we have confined our comments to a

⁵ <http://www.connected-earth.com/>

number of general points. In 2005, the Museums Association published a report into the state of collections and collecting in the UK's museums, *Collections for the Future*. A number of issues relevant to the Committee's Inquiry emerged during the MA's own inquiry leading up to that report and our submission reflects these.

2. CONSERVATION SCIENCE

2.1 It is our understanding that conservation science is not currently in a strong position in the UK. Few museums have conservation science departments and those that do exist have limited opportunities for blue sky research, given the day to day demands of museum projects. Opportunities are being missed to develop the skills and knowledge needed to preserve and develop museum collections for the future.

2.2 However, there are positive developments which offer the potential for change. The establishment of the Institute of Conservation (ICON), the new lead voice for the conservation of cultural heritage in the UK should help to raise the profile of this issue. The new Sector Skills Council, Creative and Cultural Skills, will have a remit to address the training and development deficit. Moreover, the Arts and Humanities Research Council promises to provide new research opportunities for museums. Closer working between museums and universities will be vital in many areas of museum work in future, including in improving the standing of conservation science in the UK.

2.3 ICON's expertise in this area is greater than the MA's and we refer the Committee to the detailed comments made in its response. We believe that an essential prerequisite for positive change in this area is for the issue to have a higher profile within the Department for Culture, Media and Sport. Their level of expertise and understanding in this area is currently poor, and they need to be able to give a lead to the sector.

3. USE OF INFORMATION TECHNOLOGY

3.1 The MA's Collections for the Future inquiry assessed attitudes in the sector towards digitisation of collections and the potential for IT to enhance public engagement with collections and collections-related knowledge. The report from the inquiry offered suggestions for future developments in this area.

3.2 The inquiry uncovered some scepticism from the museum profession about the usefulness of digitisation of collections. Some in the profession believe that online access to collections offers a relatively poor quality experience for a relatively high cost. It is certainly the case that in recent years there have been hundreds of digitisation projects and that in many cases the results have not been as effective as they might have been. Some of the digital resources available online pay too little attention to the needs and interests of their audiences and simply reproduce the kind of catalogue information required by professionals.

3.3 However, the inquiry firmly concluded that this should not be seen as a reason to cut back on investment in digitisation of collections. On the contrary, increased investment is needed. But in future, digitisation projects should be approached from the point of view that digitisation is not an end in itself as much as a means to an end. Digitisation does not offer quick-wins but rather represents a long-term investment. Digitised collections will be used in future interpretation in ways that cannot yet be imagined: investment in digitisation now is vital to provide the building blocks for such future projects.

3.4 Proper strategic leadership is needed in this area to target funding, ensure that initiatives are properly coordinated and interoperable and to keep an eye on the long term. In the past, there has been an absence of a single clear voice giving this kind of leadership, with DCMS, the Museums, Libraries and Archives Council (MLA) and MDA (formerly the Museums Documentation Association) all taking a lead in different areas. The MA believes that MLA is best placed to lead on these matters and that DCMS should support MLA in its work. We are not convinced that DCMS's own initiative, Culture Online, has delivered value for money and consider that funding could be better targeted if it were directed through MLA and other appropriate NDPBs as part of a coherent national strategy.

3.5 The Committee has asked for examples of the best use of IT to improve understanding of museum objects. The *Turning the Pages* project from the British Library⁶ is an excellent example. It allows visitors to experience something they could not get from seeing the real objects in the library's displays—namely the chance to study many pages from a historic book, and to look at pages in detail. It is not a substitute for seeing the real thing, but neither is it second best: it offers a distinctive high-quality experience. In these respects it offers a model for future use of IT in enhancing people's experience of museum objects.

3.6 Tate's web site is exemplary in terms of the collections related information it offers. It has digitised all works in its collection and they are available on the web site. Crucially, these are enhanced by a number of excellent facilities for virtual visitors, including a comprehensive glossary (www.tate.org.uk).

⁶ <http://www.bl.uk>

3.7 A weakness of some museum web sites which include digitised collections is that they do not give enough supporting information to provide the user with real insight into the subject area, unless they are already a specialist. However, one site which excels at offering the kind of contextual information that brings objects to life is NMSI's Ingenious web site (www.ingenious.org.uk), funded by the former New Opportunities Fund's NOF-digitise programme.

3.8 The British Galleries at the V&A (opened in 2001) set new standards in the use of IT in interpretation within museums. They combine touch screen technology with displays of objects so as to enhance, rather than detract from, the visitors' experience of the objects themselves. The Churchill Museum at the Cabinet War Rooms, opened last year, has a spectacular centrepiece which uses a huge interactive timeline projected on to a tabletop to provide access to background information about Churchill's life and times.

3.9 A report from the Nesta futurelab in 2004⁷ reviewed the use of digital technologies for learning in museums, science centres and galleries and may offer the Committee useful background information.

February 2006

Memorandum by the National Gallery

What is Conservation Science?

1.1 Conservation science is not a single discipline. It is a portmanteau term (sometimes called "museum science") covering several allied subjects:

1.2 Environmental science and monitoring of the cultural heritage, indoors and outdoors; the assessment of, research into, and control of, factors responsible for damage or degradation of works of art (for example light, changes in microclimate, atmospheric pollution including chemicals and particulates, shock and vibration), and studies of the rates of degradation of the materials of works of art. The control of these factors, with the aim of reducing damage and rates of change in works of art is generally known as "preventive conservation" (non-interventive conservation).

1.3 Research into improved practical conservation treatments for works of art (conservation interventions) and research into minimising or reversing damage done in the past by ill-informed "conservation" and restoration processes carried out on works of art and objects of the cultural heritage. An important consideration in this type of research is the objective (that is, scientific) assessment of the safety, reliability and predictability of intended conservation procedures, and to minimise the risks to the object or work of art under treatment. Many works of art require conservation treatment in order to assure their future preservation. A significant strand of this area of research involves the selection and testing of new materials to be used for conservation procedures. Recent work in these areas is guided by increasingly agreed codes of ethical practice within the conservation profession.

1.4 Technical and analytical research on the make up of the material culture through a wide range of chemical and physical examination techniques of works of art and cultural objects. This subject concerns itself with the technology of artistic production, its historical and geographical evolution, its specific features and histories in different human cultures and the associated technologies of the materials of works of art. In archaeology this is defined by the narrower field of "archaeometry"; for works of art in general, the term "technical art history" has been suggested and has gained some currency.

1.5 A vital part of the conduct of conservation science are activities concerned with the development of instruments and technologies designed to advance the areas of research summarised above. These cover instruments for monitoring and measuring environmental factors, instruments for chemical analysis and physical evaluation of works of art, instruments for gathering images (generally now digital) of works of art in different parts of the electromagnetic spectrum, including, of course, the visible. Newer instruments for non-invasive investigation of works of art are beginning to be more sophisticated, but are not widely deployed in Britain. At the same times electronic methods for acquiring, processing, organising, and archiving data collected from the study of works of art are being developed.

Conservation Science at the National Gallery

2.1 The National Gallery maintains a Scientific Department for the technical and analytical study of the Collection and to conduct research into all aspects of preventive conservation for easel paintings. It is also active in digital imaging research and development and associated technologies applied to paintings. The main areas of activity and expertise are summarised in 2.2 below. The Scientific Department works most closely with the Gallery's conservators, curators, engineers and registrars, as well as with education and exhibitions. There

⁷ see www.nestafuturelab.org

are also close links with the scientific branches of other national museums in Britain and with many institutions concerned with conservation abroad.

2.2 The National Gallery Scientific Department specialises in the material history of easel paintings including: the analysis of the materials of paintings (supports, grounds, paint media, pigments, dyestuffs, layer structure, varnishes, adhesives and consolidants); the history and technology of painting materials; the history and development of European painting technique and the literature of painting practice. Within science for conservation, the strengths are in preventive conservation, monitoring and environmental management of picture galleries (control of light, temperature, relative humidity, dust, insect pests and chemical pollutants) and their design to preserve easel paintings, as well as the assessment and monitoring of other factors potentially damaging to pictures such as shock and vibration within buildings, and for paintings travelling on loan. Work is also conducted on the possible effects of building maintenance activities on the Collection. In addition, studies are undertaken into the deterioration of traditional painting materials (colour change [fading, darkening], chemical interactions and so on), the factors responsible, and also on the safety and reliability of conservation procedures for paintings, particularly cleaning. In the last 15 years, the Department has developed a leading presence in the field of high-resolution digital imaging of paintings for accurate colour recording, the applications of these images in printing and image-processing and their transmission over fast networks.

2.3 The principal methods applied to these studies include: optical microscopy; infrared microscopy (FTIR-microscopy); scanning electron microscopy with energy dispersive microanalysis (SEM-EDX); X-ray diffraction analysis (XRD); gas chromatography and gas chromatography linked to mass spectrometry (GC-MS); high performance liquid chromatography (HPLC); high performance liquid chromatography linked to mass spectrometry (HPLC-MS). The laboratory also possesses fading chambers (for light ageing studies), an environmental chamber to test paint samples and a high-resolution scanner for acquisition of colour accurate digital images of paintings over an extended spectral range (VASARI scanner). Some equipment has been acquired through sponsorship, gifts in kind and through EC-funded consortia.

2.4 The present staff complement is the equivalent of 6.6 full-time scientific posts, including the Director of Scientific Research who plays a part in the Gallery's wider management.

2.5 Visiting researchers, and advanced students of conservation and conservation science, where the researchers have external funding from a variety of sources, spend time in the Department working on specific projects of interest to the National Gallery and in furtherance of its objectives. Support for these activities has been provided by, for example, private companies, the EC, and funding agencies such as the Leverhulme and Radcliffe Trusts. At present a joint research project with Nottingham Trent University is underway under the CASE award scheme from EPSRC. Later in 2006 a post-doctoral researcher will join the Department funded by the Dutch National Research Organisation (NWO). The Scientific Department is a member of the EU-funded EU-ARTECH (Access, Research and Technology for conservation of the European Cultural Heritage) network of 13 conservation laboratories in 8 European countries.

2.6 The purpose for which the National Gallery Scientific Department was founded in 1934 was to provide the Gallery's restorers—at that time contract staff—with the results of material analysis of the paintings in support of their conservation treatment. The basis was that safe treatments could only be carried out in the light of detailed knowledge of the constitution of the paint layers exposed to treatment, the chemical and physical behaviour of the materials involved, the relative states of preservation of the paint layers and, vitally, the ability to distinguish original paint from later accretions, repaints and repairs. For reasons of the need for extensive comparative material on paintings, and specific expertise relating to the Collection, it is necessary to maintain scientific facilities on-site within the museum. The founding purpose remains at the heart of the Scientific Department's work and continues in conjunction with the Gallery's conservators and in consultation with the the Gallery's curators. The process is overseen by the Board of Trustees of the Gallery and the Scientific Department's specific role is reported to a visiting committee of eminent scientists chaired by the Gallery's scientist trustee.

2.7 Technical study of paintings undergoing treatment has become consistently more refined over the years as a greater knowledge base of the history and technology of European painting practice has been accumulated. All paintings proposed for, or undergoing, conservation treatment at the National Gallery are subject to a programme of technical analysis devised in co-operation with the Gallery's conservators. In some cases the level of study, analysis and documentation has been (or will be) exceptionally full, as in the treatment of Holbein's *Ambassadors* (NG1314) and the present treatments of Velazquez's *Philip IV hunting Wild Boar* (NG197) and Guido Reni's *Adoration of the Shepherds* (NG6270).

2.8 The key methodologies for the acquisition of suitable technical data on paintings have been evolved largely at the National Gallery, and these procedures are now emulated in museums around the world.

2.9 Over the period in which the Scientific Department has been in existence, it has gathered a very broad technical record of the National Collection of old master paintings and on the methods and materials of European paintings in general. These records are consulted widely by museum and conservation professionals, and other scholars, in Britain and abroad. Over the years the Department has also undertaken technical analysis of works of art, dominantly paintings, in other public collections, particularly museums, where the results have been of relevance to study of the National Gallery Collection. These records are held at the National Gallery.

2.10 While technical and analytical examination of paintings provides information for best practice in conservation, it has also, from its beginnings, informed art-historical research on paintings, and this is an increasing trend. The new series of National Gallery Schools catalogues, for example, incorporate the results of physical and analytical investigation of the Collection within each catalogue entry as well as providing more refined interpretation of imaging methods applied to paintings, principally the X-ray and infrared records printed in those publications.

2.11 The National Gallery has developed a nationally and internationally recognised interdisciplinary programme of research on the Collection, involving tripartite cooperative study between the Gallery's curators, scientists and conservators. In addition to the Schools catalogues (see 2.10 above), the output of this research is disseminated in the annual *National Gallery Technical Bulletin* (published since 1977 and edited in the Scientific Department), and in the catalogues of two series of exhibitions begun in 1988: "Art in the Making" and "Making and Meaning", which aim to inform the public about the techniques and materials of groups of paintings in the Collection and individual important works. The first catalogue in the series on Rembrandt is due to be reissued as a book in 2006 in revised and expanded form to include new technical work on the Gallery's holdings in this area. These publications make frequent appearances on booklists for students of art history and conservation. Plans are being made to put the entire back-catalogue of the *Technical Bulletin* on-line.

2.12 Technical research at the National Gallery is also made available through contributions made to external scholarly publications, both books and peer-review journals, through conferences and conference publications and through lecturing and teaching. The Scientific and Conservation Departments of the Gallery take part in the training of conservators in Britain and abroad, through specialised visits to the Departments, teaching on post-graduate conservation courses and attendance at academic boards of study. Technical case studies on the National Gallery Collection have formed the basis of a Royal Society of Chemistry teachers' publication for secondary schools, Institute of Physics and Nuffield science video films and also the Salters A-level chemistry course.

2.13 More popular outputs, based on research on the Collection, have included the BBC television series "Making Masterpieces" and "Rolf on Art".

2.14 The Inquiry might note that the great majority of conservation science activity in Britain is carried out by the NMGs (National Museums and Galleries). With some notable exceptions (University College, London and Courtauld Institute), the role of universities is less significant and similarly that of regional museums.

Problems and impediments to progress

3.1 The principal impediments to maintaining the Gallery's leading presence in its fields of technical expertise in paintings studies are given in 3.2–3.6.

3.2 Lack of direct funding for capital replacement of high technology analytical and other equipment. For example, there is an urgent need to acquire a new scanning electron microscope to replace, with a modern digital SEM, an obsolete, 18-year old analogue instrument. No Gallery funds are available for this. Similarly, notice has been served by the manufacturer that laboratory's FTIR-microscope, now 15 years old, cannot be maintained for lack of parts and replacement circuit boards. Maintenance of the Gallery's "Trio" mass spectrometer poses similar challenges. There is the risk with a number of these techniques that irreplaceable data on sample analyses may be lost as a result of equipment failures.

3.3 Inability, for lack of funds, to acquire newer technology for the study of paintings, particularly for imaging work and non-invasive analysis (such as portable X-ray fluorescence analytical equipment and portable micro-FTIR and Raman spectroscopy). For example, the availability of XRF analytical equipment at the National Gallery would have greatly facilitated technical study of Raphael's *Madonna of the Pinks* (NG6596) by non-invasive means, before its acquisition by the Gallery.

3.4 At present, there are only uncertain or ad hoc funding opportunities for R&D work and "blue skies" research, rather than a system of planned programmes with clear sources of funding.

3.5 Lack of resources for digital documentation of the Collection, including scientific and conservation records.

3.6 The lack of any formal training specifically in conservation science at any British university and the lack of resources to provide training opportunities in this field within NMGs.

Recommendations

4.1 It is unrealistic to expect that the expansion of conservation science in NMGs, or the launch of some of the initiatives noted below, could be funded from within existing museum resource allocations. It would be very helpful if the scientific sections of museums were able to tap resources presently only available to universities, either by the mechanism noted in 4.2, or through partnership schemes with the higher education sector.

4.2 Establish the scientific sections of the NMGs as part of Britain's academic science base, and ensure that the NMGs have recognised academic analogue status allowing their application to EPSRC for research funding for staff and equipment. Establish a procedure to foster post-doctoral research in conservation science in museums.

4.3 Provide funds to maintain and build on existing research facilities within conservation and science sections of NMGs to enhance scientific work in preventive conservation, active conservation and material-based studies on collections.

4.4 Facilitate co-operation between the scientific branches of the NMGs by providing some pooled resources. The DCMS might consider this proposal.

4.5 Establish at least one formal university-based MSc degree course in conservation science as a co-operative venture between a university and a museum, and build programmes at PhD level, widening the scope of the V&A-RCA model.

4.6 Provide funds for documentation projects for museum technical and conservation projects, including image databases.

4.7 Provide resources for the development of publicly accessible databases on the material history of museum collections. With the proposal in 4.6, a funding initiative aimed at increasing public engagement with collections by electronic means, including remote access, would be suitable.

8 February 2006

Appendix

SCIENTIFIC RESEARCH AT THE NATIONAL GALLERY: SCIENTIFIC STRATEGY

1. Scientific work is carried out to advance a number of key published National Gallery objectives. The main areas involved concern:

- Preservation of the Collection;
- Study and interpretation of the Collection.

2. The principal research activities of the Scientific Department are conducted within a framework of:

- Preventive conservation;
- Technical and analytical study of Old Master paintings, 1,250–,1900;
- Digital imaging, image processing and electronic documentation of paintings.

3. The strategic objectives of the National Gallery's scientific research are to:

- Improve methods of monitoring the Collection and the Gallery environment with a view to long-term preservation of the paintings;
- Improve and refine methods of environmental management in the Gallery, particularly lighting, temperature, humidity and pollution control
- Investigate the effects of transport on paintings and institute best practice for safe movement of pictures;
- Provide laboratory analytical facilities for the examination of paintings undergoing conservation treatment, and an expert knowledge base for material interpretation derived from analysis;
- Investigate the safety and reliability of conservation treatments applied to paintings;

- Study and analyse the materials of easel paintings for the period covered by the National Gallery Collection in support of art historical research, cataloguing, and to continue to build a comprehensive history of the methods and materials of European painting;
- Research the deterioration of traditional artists' materials, the factors responsible for deterioration and the physical and chemical mechanisms involved;
- Develop methods of high-resolution digital imaging for paintings, for long-term colour measurement, manipulation of images including colour reconstruction and image processing of infrared and x-ray images;
- Continue to improve and develop methods applied to all aspects of the National Gallery's scientific work.

4. The outcomes of these research activities (listed above) are:

- Improvements to long-term care of the Collection; lowering risk and reducing the impact of factors that damage paintings. The application of "best practice in preventive conservation";
- Improvements to the safety and reliability of active conservation;
- Increased understanding of the technical history of the Collection;
- Improvements in documentation and interpretation of the Collection;
- Provision of technical information on the Collection to scholars, students and the general public. Dissemination of technical information on paintings and on conservation through publications, conference papers, teaching and lecturing;
- Maintenance of the Scientific Department as a centre of expertise for consultation by regional museums in the UK and other museums around the world;
- Raising the national and international profile of the National Gallery.

Memorandum by National Museums Liverpool

BACKGROUND: CONSERVATION SCIENCE AT NATIONAL MUSEUMS LIVERPOOL (NML)

NML employs one conservation scientist, funded directly through core grant-in-aid. This post is based at the Conservation Centre, and covers scientific analysis of diverse collections ranging from paintings to large transport collections. The conservation scientist is also responsible for the co-ordination of environmental monitoring at the eight museums and two collections stores, as well as advising on environmental control for new developments and is supported in this by an environmental officer.

In addition, there are two research scientists at NML's Conservation Centre, funded by external grants (currently through PSRE funding) commercially exploiting research and development carried out in the areas of laser cleaning, laser scanning and rapid prototyping. These members of staff are also able to undertake scientific analysis and advise on "scientific" issues as and when required by NML or outside organisations.

RECOMMENDATIONS

- Specific allocation of funding for conservation science, to which museums and other heritage organisations can apply alongside universities.
- Definition of priorities for conservation research on a national level.
- Regional centres to provide advice and scientific support to museums, local heritage organisations and private conservators.

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

The co-ordination of conservation science tends to take place on an informal basis, through conferences, publications and professional groups. These may reflect current priorities within museums and other heritage organisations, but there is no formal process for identifying these. Informal networking within the profession is an important means for sharing knowledge, and building collaborative projects. Collaboration with universities has major benefits, in terms of access to specialist facilities and knowledge, but universities have very different research priorities, ie. not based primarily on the needs and use of museum collections.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

Core funding for many National Museums provides basic staff and facilities. A conservation scientist within a museum can have an extremely broad remit, with a range of materials and types of collection, so that there is little opportunity for research. Where scientists have responsibility for aspects of preventive conservation, there can be a heavy admin load associated with this that limits the time available for scientific research.

Funding from external bodies, such as the Leverhulme Trust, PSRE or the Mellon Foundation can successfully support major research projects in museums. However, it is difficult to find the expertise and facilities to undertake scientific analysis in support of smaller projects eg. analysis of paint media, coatings or natural resins as part of the investigation and treatment of collections. Smaller museums and independent conservators have very limited access to conservation scientists. Funding for analytical equipment is very difficult to secure in a primarily arts-based organisation, where the sums required to upgrade or purchase scientific equipment are comparatively high.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

The UK doesn't have a central laboratory to undertake fundamental research, or other body to set standards and protocols for the application of research. Other EU countries, eg. Austria, Germany, Italy, The Netherlands, have government-funded central or regional laboratories who advise on conservation and provide research and analytical services.

The UK has been a world leader in the field of preventive conservation, but there is not always the support to ensure that new methods for environmental monitoring can be applied at the practical level.

There should be more interaction between public bodies such as English Heritage and the skills and technology resources that are present within museums, particularly in the regions. National Museums Liverpool does act as a regional resource centre for local museums/ art galleries/ councils and heritage sites, however this happens on an ad-hoc basis and could be much more efficient and effective if there was a more formal and public link which would make these resources more readily available to those that need them. It would have to be sufficiently resourced, to ensure that the museum service was not affected in any way.

Is there a satisfactory process to develop practical applications of conservation research for the market?

Public Sector Research Establishment grant (3 awards) has helped to fund the development of museum based technology (laser cleaning and scanning and replication) within NML's sculpture conservation department. This funding has not only allowed us to develop the equipment for use on the museums collection (improving best practise) but has allowed us to use this technology outside the museum (offering a museum quality service) and has begun to generate income for the museum.

This form of grant (PSRE) is not widely available and without this investment (time, staff and funding) it would have been extremely difficult for us to offer our services and technology to those outside the museum in a wider cultural heritage field.

Other successful developments include the EU funded research project to develop light dosimeters (LiDo), and the development by the V&A and a commercial partner of a network-based environmental monitoring system. The latter project inevitably resulted in a product designed primarily for a large London museum, which has been difficult to adapt elsewhere without comparable staff resources.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

NML are leaders in this area, and public engagement is a fundamental part of the work of The Conservation Centre. The science of museum objects forms the basis of an innovative new permanent exhibition ("*Reveal*") at the Conservation Centre, due to open in Spring 2006. This exhibition demonstrates how scientific techniques are used to find out about and conserve our cultural heritage, and there will be a working laboratory at the centre of the exhibition.

The Conservation Centre has been actively involved and successful in this form of public engagement since it opened in 1997, for example, through public lectures and tours of the conservation departments. The sculpture conservation department and laser technology section (Conservation Technologies) have been working on

larger external contracts such as public monuments and through public debate and publicity generated (through local radio, papers and TV) have engaged with (perhaps) a wider circle of the public than those that visit museums, about the benefits of conservation to the population and environment at large.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

Through non-contact scanning, replication, digitisation of artefacts and haptic technology (touch technology) there are a wealth of benefits to the understanding of the object, which can then be translated to the public at large through innovative interactive and hard copies of artefacts that the public can physically engage with (to protect the real objects for future generations).

These types of activities can occur within the cultural institution, educational establishment (as the technology allows very accurate copies to be available to the public) or over the internet, promoting access, education, understanding and enjoyment.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

NML's Conservation Technologies is actively engaged in a number of these types of projects for a variety of Museums and art Galleries. The projects have been variously funded through PSRE, commercial income and grants such as Nesta.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

NML's Conservation Technologies are and have been involved in a number of projects for public institutions, such as Royal Historic Palaces (replication of graffiti in the Tower of London to allow people to touch very accurate copies of the fragile Tudor inscriptions on the cell walls), National Portrait Gallery (marble copy of Cook, from a scan of the original to protect it from any damage caused in traditional casting for an interactive on the gallery that will allow the public to touch an exact copy in the original material), Norton Priory (scanned and digitised copy of the 3 metre tall 14th century sculpture of St Christopher, which looks at the sculpture's history, manufacture and context within in the priory over 9 centuries in an innovative and engaging IT environment in the gallery space which the sculpture is displayed).

Memorandum by the National Portrait Gallery

This submission focuses on the ways in which IT can improve public access to and understanding of cultural objects.

THE COLLECTION

1. The National Portrait Gallery collects portraits of the men and women who have contributed or are contributing to British history and culture. The collection is made up of the Primary Collection of 10,000 portraits used for display and a Reference Collection, a national study resource, made up of 320,000 engraved and photographic portraits.

INVESTMENT IN ACCESS

2. At the National Portrait Gallery, investment over the last decade has brought exceptional public access and understanding of historic and contemporary portraits as cultural objects. In this period, as the initial priority the Primary Collection of 10,000 portraits has been researched and digitised, published in hardcopy form, on CD-ROM, made available on site in a cutting edge innovative touchscreen Portrait Explorer facility and off-site by way of the Gallery website. Additionally, the next high priority area, the Reference Collection, has been partly catalogued and digitised, to the extent of 75,000 out of 320,000 engravings and photographs, and made available on the Portrait Explorer and the Gallery website. The target is to make 160,000, or 50 per cent, available by 2009, subject to resources. In parallel with this programme, considerable investment is being made in research and in the provision of detailed information and interpretive content to enhance the understanding of national history and biography, as well as of portraits and portraiture.

BENEFITS

3. The national and international importance of this programme can be demonstrated by the exceptional high website usage figures which has made the Gallery website one of the most popular of its kind in the United Kingdom, currently with some 5.5 million annual visits. This has been partly paralleled by the growth in income from the sale of portrait images both at the Gallery and through the website. The public can now order online from a choice of 36,000 images. However this income covers only a small part of the costs of the programme. The Gallery has obtained financial support from a mix of private and public sources but the funding of the programme is problematic and its future is not secure, despite its manifest benefits. Compared with some other publicly funded cultural web sites, the Gallery believes that its programme provides quite exceptional value for money as an outstanding and very heavily used public resource.

THE FUTURE

4. There is the potential to extend this work nationally to cover other portrait collections around the country and to provide an exceptional interpretive resource into portraiture, biography and history, as the programme develops, subject to funding.

Memorandum by the Royal Academy of Engineering

CONSERVATION SCIENCE

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

1. The extent to which there is formal co-ordination of efforts in conservation science is unclear. However, it was felt that, since conservation specialists operate within a range of organisations and individuals in private practice, and given the specialist nature of the work, good links exist. Key co-ordinating bodies include: the Archives Council, which has a number of on-going initiatives to co-ordinate communications and knowledge; the Society of Museum Archaeologists is a key group, setting standards and providing a forum for discussions; and English Heritage whose science advisors provide expertise to the wider industry. English Heritage also has a degree of liaison with Historic Scotland and Cadw (the Welsh heritage organisation), and the Building Limes Forum (The Building Limes Forum is a charitable organisation with members in the UK and overseas. It encourages expertise and understanding in the use of building limes). Co-ordination is further assisted by a number of organisations at different levels both nationally and internationally—eg ICOMOS (International Council on Monuments and Sites) and ICOMOS-UK and The European Construction Platform which has Cultural Heritage as one of its six focus areas.

2. The Arts and Humanities Research Council (AHRC), Economic and Social Research Council (ESRC), Engineering and Physical Science Research Council (EPSRC), and Natural Environment Research Council (NERC), working with English Heritage, have identified a need to build working relationships across discipline barriers in the historic environment research community. They are holding a facilitated workshop in Birmingham on March 29th 2006, with the aim of forming up to five “research clusters” in cross-cutting themes. These will be funded for one year to build inter-disciplinary research communities.

3. On a smaller scale, and a more informal basis, the various clubs and specialist repairers of historic vehicles have excellent IT-based networking of information on restoration and maintenance, which contribute greatly to the promotion of best practice. This is a good example of how IT can be used to enable co-ordination of research and experience in conservation.

4. Italy provides an interesting international comparison to the situation in the UK. In Italy conservation is a big business which involves universities, state authorities, private offices and contractors. The high level of co-ordination is for several likely reasons. Between 1960 and 2000 there was little new building work going on, and as a result many architects (and engineers) were trained in restoration, and consequently there are also very good specialised research facilities. Ancient buildings (medieval or pre-medieval) are very much part of the Italian urban environment, which is not the case in the UK. These structures need a large amount of restoration, especially since Italy is in many parts an active seismic area, meaning that restoration and maintenance is also a health and safety issue.

5. In Italy research is funded by the state and the EU. There is a similar arrangement in Germany on a smaller scale—research is done by the Universities, funded by state, church and EU.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

6. Conservation research in engineering departments at UK universities is mostly concerned with process life cycles, preserving the longevity of materials during and following manufacture and endeavouring to recycle materials for further use. Funding for research is usually through the Research Councils.

7. In terms of other funding, it would appear that Government conservation funding is being pruned, eg English Heritage's current grant has been "frozen", so that with inflation it has effectively been cut. The replacement for the PiI (Partners in Industry) scheme, with larger sums to be applied for but to be matched by greater industry contributions and with more complex project arrangements, has probably not assisted here.

8. In answer to the second part of the question, there is a recognised shortage of conservation specialists in the UK. Finding the skilled and specialist conservation staff is difficult, as there are often only one or two individuals with the specific technical skill required. For example, in undertaking the Channel Tunnel Rail Link (CTRL) heritage works (a £15 million archaeological project associated with the construction of Channel Tunnel Rail Link) it was discovered that there were no county council or museum based conservationists in Kent. Expertise had to be sought remotely, from either the Museum of London Specialist Service or the Lincolnshire Conservation Laboratories.

9. There is concern, in terms of buildings and records, for the significant stock held in local authority ownership. Local authorities hold a large number of buildings on the Buildings at Risk (BAR) register, and often lack both the resource and the skills to cover their upkeep. This becomes a particular issue where the building no longer suits the needs of the local authority in terms of size, location or use. In terms of conserving records, Edinburgh City Council has recently come under attack for not properly maintaining and preserving its archives.

10. The skills base is therefore a cause for concern, at professional and at craftsman levels. The CITB (Construction Industry Training Board) has done some work on this issue.⁸ The results of a research project carried out by Arup and De Montfort University assessed the skills-base in relation to the maintenance of heritage buildings, and found worrying shortfalls.⁹

11. A "capacity and skill base to maintain [our] cultural heritage for future generations" requires informed and adequately-funded practitioners—English Heritage staff, local authority conservation officers, architects, engineers, craftsmen, and so on. This demands adequate educational and training provision. In this respect, it is regrettable that the excellent English Heritage training centre at Fort Brockhurst near Gosport was closed down after a fairly short life. Its closure indicated a worrying attitude among those responsible for its closure towards this important aspect of conservation—training by those who know, so that others can learn. These are not necessarily "high-tech" skills, eg slating, carving stonework, drystone walling, ironfounding, carpentry repairs, are all essential but generally traditional skills.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

12. The impression is that insufficient funds are allocated to the application of science and technology to conservation monitoring, and that we are certainly not ahead of the game internationally. English Heritage has a number of on-going initiatives to quantify and assess key aspect of the heritage resource—for example the Monuments Protection Programme—but questions are usually asked reactively once damage has occurred, for example to Silbury Hill.¹⁰

13. Despite this, there have been notable advances in the UK in this area. For example, a recent technological advance has been the introduction of laser scanning for the *in situ* surveying of buildings and other cultural objects, saving time and money. It is particularly advantageous for recording work where access is difficult and/or dangerous. It produces a database from which plans, elevations, measurements, moving images, and other information can be presented. This is one area where modern technology is greatly superior to traditional practice.

⁸ Published in *Employers' Skill Needs Survey*: Autumn 2002. CITB, London, and *CITB Skills Forecast Report: February 2002*. CITB, London.

⁹ The report can be found at: <http://www.maintainourheritage.co.uk/pdf/module6intro.pdf>

¹⁰ In 2000, a large hole appeared in Silbury Hill after an excavation shaft, created by investigations of the site in the 18th Century, collapsed. After this collapse, English Heritage undertook an in-depth investigation to assess the Hill's stability, and produced plans for restoring the hill and monitoring its condition in the future.

14. Some interesting work is being done on the mechanisms of stone decay, and in the use/development of new materials and their application in conservation—an area that needs to be nurtured. As with much research, it is important that what has been done is properly documented and available—a CRISP (Construction Research and Innovation Strategy Panel) project a few years ago identified this as a real problem within the construction industry—and perhaps elsewhere also.

15. There are a lot of monitoring techniques and devices available. However, it is more important to understand what is needed than to use “high tech” methods for their own sake. A great deal of condition monitoring and conservation does not require “cutting-edge science and technology”. What it does require is regular care, ie ensuring that buildings are inspected regularly and subject to planned routine expert maintenance. Unfortunately, inspections and maintenance are easy casualties for deferment when annual budgets have to be slimmed.

16. Another welcome advance is the state-of-the-art, purpose-built archive store at English Heritage’s Headquarters at Swindon. This houses the National Monuments Record, and is a good example of the application of climate control for the long-term preservation of irreplaceable records. However, it is likely that many other archive stores are not so well-served.

17. Science and engineering in the UK have played, and continue to play a major part in the conservation of rare books. Cradles have been developed in which fragile books and manuscripts can be held safely and imaged at high throughput because both focus and magnification are permanently fixed. Curvature effects at the spine are corrected by software, and image quality as well as information in marginalia are thus retrieved. This has made it possible to digitise large collections in months, rather than the years it would have taken without the innovations. There is therefore much scope for applying new technology to improving the accessibility and preservation of books, manuscripts, illuminations and pictures held in museums, libraries and galleries.

Is there a satisfactory process to develop practical applications of conservation research for the market?

18. The Academy Fellows consulted were not aware that any such process exists.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

19. Demonstrations of the use of conservation science can encourage public engagement with both science and technology, and our cultural heritage generally. This is demonstrated by the popularity of historic research TV programmes, for example, “Meet the Ancestors”, which seeks to tell a complete story of an individual’s ancestry. The science in this programme is presented in a digestible and accessible form. “Time Team”, the archaeological investigation programme, has also promoted the use of conservation science by using a wide range of specialists to interpret finds and opinion in a simple, accessible form. Another example is “Restoration”, which has encouraged TV audiences to become involved in campaigning for the restoration of historic buildings.

20. By showing the conservation methods used such TV programmes promote interest beyond just the artefact itself, to the science involved in restoring it. This could be encouraged further through exhibitions, and allowing sites to be accessible—with good interpretation both of the work that has been done and the significance of the building, site or record.

USE OF INFORMATION TECHNOLOGY

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

21. IT is being increasingly used at all levels of the archaeology and heritage profession to record and analyse features, objects and structures, and has become an indispensable tool. Digital technology enables still images, video and sound files to be viewed alongside textual information and, increasingly, offers the capability to explore sophisticated three dimensional models, visualise complex data and interact with multi-media environments. IT offers the facility to improve accessibility by making digital versions of many of our paintings, ceramic objects, rare books, manuscripts or ancient artefacts, which cannot be put on public display, for reasons of space, fragility or finance. The images can be viewed on the computer screen and fragile items do not then need to be handled. Additionally, the images can be preserved by electronic storage, even if the originals are lost or damaged.

22. Publishing such images on the internet creates a vast and easily available resource. For public understanding of and access to cultural objects, the internet represents a democratisation in global cultural heritage, whereby all people with internet access can view, explore, share, study and/or engage with many different aspects of art, architecture and archaeology, without disturbing the original object itself. As an example of this use of the internet, English Heritage is, in its “Images of England” project, making a photograph of every listed building in England available through its website. Computer graphics and laser-scanning can provide static and moving “walk-round” and “fly-through” experiences of buildings and other structures, for example English Heritage has done this with the 1779 Iron Bridge over the River Severn, a key industrial monument.

23. The caveat is that the use of the internet should be seen as ancillary to an experience of the artefact or structure itself, not a substitute. Although technology can provide easy access to many, it cannot replace the ability to physically see and handle objects (except where this is necessary for preservation reasons). Furthermore, there is the threat that the internet poses of allowing people to restrict their experience only to those things which they have a prior interest in. Visiting real sites and museums may allow people to engage with exhibits they would have never sought out themselves.

24. Aside from its power to create a vast repository of images, another extremely important role of the internet and other aspects of IT is in respect of the facilities they offer for the recording of, and providing access to, cultural information in the form of important data and archive material. Such information is, thanks to technological advances, now available in wider varieties and on a greater scale than ever before. On the CTRL heritage project, the services of ADS, the Archaeological Data Service, were utilised to take the vast amount of data generated by the project, process it into an appropriate form for web use and make this available via web based searches. The Nuclear Decommissioning Authority is currently undertaking a project to look at the development of a National Nuclear Archive to preserve documents, film, video and DVD evidence of the UK’s nuclear energy programme. The project is looking into the feasibility of digitalising the current records, not only to preserve them, but to make them readily available to current and future generations.

25. However, a potential downside of the rapidity of technological innovation relates to the threat that technological obsolescence poses to the retrieval of records stored on electronic media. This highlights the need for important documentary records to be held on paper, irrespective of other means of storage. For example, anything stored on the earlier larger-diameter floppy discs is virtually inaccessible now, because the software and the hardware needed have generally been discarded. In contrast, acid-free paper of adequate quality should endure for centuries.

Is there scope for improving the use that UK galleries, museums and others make of such technology?

26. Many galleries have harnessed the advantages of IT, and the public have a high expectation of digital presentation both during visits and when choosing where to visit. However, the uses of IT in galleries, museums or sites can always be refined and developed. For example, in historical buildings, technology could be provided which visually recreates a “missing” tower at a ruined or partly ruined castle, or a room within an old building. This needs to be done with skill, always being clear as to what is conjecture, what source material has been used etc.

27. It must be stressed again that such aids to understanding should not be seen as a substitute for the “real thing”. It is sometimes the case that in museums children seem to be interested almost exclusively in the screen displays and “hands-on” interaction, at the expense of seeing the tangible objects around them. Furthermore, the TV or computer screen tends to “sanitise” the image it presents, and this can often seriously mislead. The past was a different and often dirty and nasty place. That’s as much part of our cultural heritage as the good things, and that needs to be presented as far as practicable, to aid understanding. For example, the Tower of London houses the Crown Jewels, but is also a former prison and place of execution.

28. It is also important to recognise that the general public and the specialist have quite different needs. For the former, IT should be used to provide accessible and digestible information. For the latter, it is important that specialised information and raw data is stored and made available by museums, research institutions and heritage projects.

29. With regard to the use of the internet, efforts to improve public understanding of, and access to, the UK’s cultural heritage would undoubtedly benefit from more scientific approaches to the provision of information. Because of the sector’s reliance on images to convey information, scientific developments in imaging have huge potential for cultural heritage. For example, they offer scope for improving the “findability” of images on the internet. Images of any description are, by their nature, difficult to find in a digital environment, because they have no inherent “data” for machine-driven search engines to search on. This means that users are dependent on image providers adding metadata to images. However, the words a museum professional chooses (eg artist

name) to add to an image may not be the words that a member of the public chooses to search with—often, people will be looking for pictures “of such and such” rather than “by so and so”. Technological developments in military or medical sectors for the exploration of digital image content (eg Content-based Image Retrieval for examination of mammograms), could be invaluable, if developed in appropriate ways, for developing internet-based image search engines.

30. Many IT applications in the cultural heritage sector are developed on an *ad hoc* basis where systems are created without recourse to tools and methods that are used to great effect elsewhere. This can lead to a lot of reinvention of the wheel and, inevitably, to the subsequent failure of a great number of “technological” projects. Yet, in the world of systems engineering there are a multitude of tried-and-tested ways for developing complex technological solutions which would be of considerable value if employed by the cultural sector. In essence, such tools give focus to the development of IT projects and, most importantly, help to ensure a finished product that is fit for purpose, ie an information system through which users can fully engage with the inherent information in successful and meaningful ways.

31. There is also a great deal of scope for developing communications at the technological-cultural interface. The late, partial or utter lack of take-up of new science and technology by cultural heritage institutions might be improved if more consideration was given to their needs during the development stage. For example, scientists pursuing a novel area of research for medical purposes could be encouraged to think of the possible applications beyond the specified medical uses. There seems to be a growing desire within both scientific and cultural heritage sectors to work in more collaborative ways. This is not new: the development of virtual reality involved archaeologists and architects from its earliest days, because the problems faced by cultural heritage lent themselves beautifully to the solutions that the new technology offered. But such clear interdependence is not always present. It needs to be built up slowly and deliberately, and this needs clear strategic vision and an appropriate degree of support. Our cultural heritage could clearly benefit from the appliance of science. The key to developing and extending such benefit may be in breaking down the barriers that lie between the two sectors.

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

32. There are many organisations making good use of IT for the dissemination of cultural heritage information. High profile examples include the British Museum, where many objects can be viewed and information gained about them to augment the visiting experience; the Portable Antiquaries Scheme which provides good images and information; and English Heritage’s “Images of England” project, with its use of laser-scanning, eg, for the Iron Bridge, mentioned above. A good example of using the internet to display artefacts that could be destroyed by being put on view is the site created to allow viewing of the cave paintings in Lascaux, France. The public were barred from access to the caves, as too much damage was being caused to the paintings.¹¹

33. There are also helpful examples of initiatives which attempt to cross the apparent arts/science divide. For example, the Wellcome Trust is currently seeking applicants to its Sci-Art Awards, and the Arts and Humanities Research Council (AHRC) is currently funding an array of initiatives into how better use can be made of IT in arts research. One of the projects under the AHRC ICT Strategy Projects scheme is “The hunt for submarines in classical art; mappings between scientific invention and artistic inspiration”. The project, which is indicative of a growing arena, is concerned with the use, within visual arts, of advanced imaging IT developed for scientific applications.

34. There are a number of interesting projects which Fellows of the Academy have had direct involvement with. One is the CTRL heritage project, referred to in earlier comments. Another is the “Connected Earth” initiative (www.connected-earth.com/) which deals with the heritage of the telecommunications industry. It addresses the heritage that BT had amassed and the increasing difficulty of balancing the commercial interests of a company with its wider social and national responsibilities. The initiative also opened up the collection to a wider audience through use of web technologies and partnerships with the museums sector. The website is interesting in that it showcases a lot of artefacts, but in the context of encouraging people to see them directly—encouraging the audience to visit the museums that house the exhibits. A further major project with which a Fellow is actively involved is the “Engineering Timelines” project. As this project seems particularly pertinent to the interests of the inquiry, it is described in detail in an appendix to this response.

8 February 2006

¹¹ The paintings can be viewed here: <http://www.culture.gouv.fr/culture/arcnat/lascaux/en/index.html>

Appendix

ENGINEERING TIMELINES

Engineering Timelines was developed with the following three challenges for improving access to and understanding of cultural objects in mind: Firstly, information about cultural objects is maintained by competing systems such as the National Trust and English Heritage. Details of the collections are available on the internet but it does mean consulting many different lists, which do not necessarily work in the same way: some work geographically, some thematically, a few historically. Secondly, getting enough information about a cultural object, in advance of a visit, is often a problem. Often the best stock of information about a cultural object is contained in visitor information on sale at the site, but this is of no use when one wishes to find out if a site or exhibition is worth visiting, and this is of course a problem for small sites without visitors' centres. Finally, engagement with culture is improved if it can be put in context. Interest in a structure or artefact is increased by understanding where it fits geographically, chronologically, or within a body of work by a given engineer.

Engineering Timelines (www.engineering-timelines.com), a not-for-profit company and part of the National Grid for Learning, has been developed to address these problems. It is a database of UK engineering achievement and innovation. It shows where the UK's engineering cultural objects are by combining the many separate lists into one and then displaying entries on a scale map of the UK. It allows access to information about cultural objects in advance of a visit by providing information on the internet with references for following up (and all entries are written in a way that children can understand). It sets sites and exhibits in context by allowing the user to make connections between different engineering achievements by location, engineer, time period and type. This is a very interesting example of how science and technology can be used to improve access to and understanding of our cultural heritage, as it both shows how our scientific, technological and engineering heritage can be preserved, and how we can use technology—namely IT—to enable that.

Memorandum by Professor Cristina Sabbioni

CONSERVATION SCIENCE*

How is conservation science, in Italy and internationally, co-ordinated between museums, universities and other organisation? Is there an effective transfer of knowledge into practice?

International situation and the role of Italy within the international context.

1. Since 1984, the European Union has funded scientific and technological research applied to the protection, conservation and valorisation of Cultural Heritage. In the period 1986–2002, Italy undertook the co-ordination of 16 European projects (as the UK, followed by Germany with 11, and France with 5). Italy has also been leader in terms of its participation in EC Projects, being partners in 70 per cent funded projects (against the UK 50 per cent, Germany and Spain 40 per cent).
2. In the 5th Framework Programme on Research within the key action “The City of Tomorrow and Cultural Heritage”, projects focused on the protection, conservation and fostering of cultural heritage, were funded for €40 million. The creation of the Key Action “City of Tomorrow and Cultural Heritage” reflected the innovative idea of bringing together research efforts on all aspects of the city within a single synthetic approach. In addition, it took into account the peculiarities of European towns, by considering the integration of cultural heritage within a contemporary creative context. Thanks to the involvement of end-users in the project partnership, for the first time in EC FPs on Research, the transfer of knowledge was enhanced and implemented in most of the cases. However, the Expert Advisory Group (EAG) emphasised that greater efforts should be made by the DG Research to play a more proactive role in the disseminating results of funded projects towards all levels of end-users.
3. Within the 6th FP, funding was limited to €10 million within the programme Research in Support to Policy. In spite of the reduction in funding and the high competitiveness of the project approved (1 project funded out of 9 proposals), at the Workshop organised by the EC on 22–23 April 2004 in Brussels, 51 EC projects were presented focusing on science and technology applied to cultural heritage conservation. As far

as the Italian situation is concerned, 12 projects are coordinate by Italian private or public organisations, and 80 per cent of the projects envisage the partnership of Universities, the National Research Council (CNR), governmental institutions responsible for the conservation of cultural heritage (Soprintendenze), as well as enterprises.

4. EUROMED Projects funded by the EC within both 5th and 6th FP also constituted valid instruments for the effective transfer knowledge from EU Member States to Mediterranean countries in the field of conservation science. Among them, Discover Islamic Art is an ICT application to virtual museum, Prodomea to the conservation of archaeological masonry and Rehabimed to the management of cultural heritage.

5. Several International Conferences were also organised by the EU on SET in the sector of cultural heritage conservation, with the specific aim of effectively transferring knowledge at the European level. The first Symposium, entitled “Science, Technology and European Cultural Heritage”, was organised in Italy in 1989, and was attended by 450 participants, including scientists and conservators. Subsequent EC Conferences on “Research for the Protection of Cultural Heritage: Opportunities for European Enterprises” were held in Rome (1997), Aachen (1998), Santiago de Compostela (1999) and Strasbourg (2000). In 2002, a conference on “Cultural Heritage Research: a Pan-European challenge” was held in Krakow, with the specific aim of focusing the applicative output of the research on cultural heritage to the conservation sectors. Finally, the most recent conference on “Sustaining Europe’s Cultural Heritage: from Research to Policy”, held in London in September 2004, recognised the crucial role played by scientific and technological research applied in the process of European integration, and its impact in in many areas of economic and regional development, environment, construction, tourism, job creation, education, improvement of skills through technological innovation and social identity.

6. Regarding USA, a bilateral USA-Italy meeting was organized on April 2001 in Venice to set up a common agenda for SET applied to cultural heritage. To date, it has yet to be implemented.

National situation

7. The national contribution to the scientific research applied to the safeguard of cultural heritage has mainly been promoted by the National Research Council: firstly through the Committee on Science and Technology for Cultural Heritage (1989–99), with funding of 48 million Euro. Then, from 1997 to 2005, the “Progetto Finalizzato Beni Culturali” allocated funding for 30 million Euro to a number of projects. Under this programme, for the first time, Italy was able to catalyse all the research teams working on SET applied to cultural heritage and bring together researchers from different scientific disciplines (physicists, chemists, geologists, biologists, engineering) with those active in the conservation sectors, such as archaeologists, architects, conservators, cultural heritage public and private managers, enterprises. The programme effectively allowed the formation of a background gathering at national level on conservation science, constituted by CNR institutes (30 per cent), universities (54 per cent), governmental organisations (9 per cent) enterprises (7 per cent). The output of the funded projects directed to end-users consisted of 67 instruments for diagnosis (including 23 patents), 112 databases and 340 publications. A strong effort was directed towards the exploitation at the international level of the results achieved by the “Progetto Finalizzato Beni Culturali”, through the publication of a summary in English, French, German, Spanish and Arabic.

8. At the present time, the National Research Council has embarked upon a process of reorganisation into 11 Thematic Departments, one of which is the Department of Cultural Heritage. This Department will bring together all CNR institutes working on cultural heritage from the archaeological and historical area with the research team focusing on the various aspects of conservation science, including basic and applied research.

Is conservation adequately funded in Europe and in Italy, and is it directed at the right areas?

9. Scientific research on cultural heritage protection is characterised by small to medium-scale interdisciplinary project teams, working in research institutions or universities. The broad themes, large scale projects and strong links with national research councils proposed by EC have worked against, and fatally damaged this thriving area of research. This is because the modest level of resources required and the size of the project teams do not fall within the ERA criteria currently implemented by the EC 6th FP on Research.

10. Moreover, the structure of national research councils often works against interdisciplinarity, which is one of the strengths of this area of research. To maintain its competitiveness, it is necessary to create the resources and infrastructure required to support the application of science and technology to monuments and archaeological remains, and associated collections and archives.

11. The present levels of funding do not offer adequate support to this area of research, at either the European or Italian level, now that the “Progetto Finalizzato Beni Culturali” has come to an end.
12. Among the priorities of the Italian Research Agenda, Cultural Heritage is not mentioned; it therefore risks being dispersed among the different funded research sectors, such as ICT, material science, biotechnology, which will hinder the transfer of knowledge into practice.
13. As Chair of the Expert Advisory Group (EAG) of the “City of tomorrow and cultural heritage” within 5th FP on Research in terms of discussion on priorities, the significance of the EU role is evident if national government are not supporting.
14. Within this context it relevant to highline that the actual discussion on the Specific Programme of the EC 7th FP for Research includes Cultural Heritage within the Thematic Area “Environment”—Activity “Environmental Technology” developing the following issues: “Protection, conservation and enhancement of cultural heritage, including human habitat: Technologies for the environmentally sound and sustainable management of the human environment including the built environment, urban areas, landscape, as well as for the protection, conservation and optimal use and integration of cultural heritage, including environmental impact assessment, models and tools for risk evaluation, advanced and non-destructive techniques for damage diagnosis, new products and methodologies for restoration, mitigation and adaptation strategies for the sustainable management of both movable and immovable cultural assets”.

ROLE OF SET

In what ways can technology contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

15. Cultural heritage is a dynamic system that can only underpin sustainable development if it is protected. While an integrated approach to the natural and man-made environment is important for safeguarding natural resources, it is essential to recognise the uniqueness and distinction of European cultural heritage research. Further studies are necessary to investigate the specific approaches required by cultural heritage assets that are distinct from the natural environment. Cultural heritage is the result of a sustainable balance between valued historic traditions and the benefits of a vibrant European economy. It consists of both movable and immovable cultural heritage: it not only comprises the built heritage, but also the heritage manifested in the multiplicity of materials and the complexity of problems found inside buildings. Thus, cultural heritage is affected by both the external environment and the internal environment. Cultural tourism has a greater impact on the environment than eco-tourism, which with careful management can be renewed. Since cultural heritage is a non-renewable resource, the evidence provided by research is fundamental when legislating to protect individual monuments in context, and to resolve land use conflicts, for example the impact of brownfield sites and natural mineral quarries and extraction.

Is there a scope for improving the use of Italian galleries, museums and others make of SET?

16. Two examples may serve to illustrate this point:

- Light is one of the most powerful parameters in altering colour, but works of art cannot be appreciated without light. Therefore, a compromise has to be found, as soon as sensitive objects are put on display. Currently, some instruments exist, which are capable of measuring the light levels inside the exhibition rooms. However, they are expensive and do not take into account possible additional effects induced by the environment (relative humidity, temperature, pollutants). The EC project LiDo (A light dosimeter for monitoring cultural heritage: development, testing and transfer to market) aimed at the realisation of light dosimeters, which (a) had low cost; (b) were aesthetically acceptable; (c) could be easily controlled also by non-trained personnel; and (d) could take into account the overall environmental effect. Two different dosimeters, LightCheck[®]U and LightCheck[®]S, with different and complementary operative ranges, were realised. The basic principle consists in a colour change, which makes it possible to evaluate the luminous exposure on visual inspection by simply comparing the colour of the dosimeter with that of a calibrated chart. Currently, the dosimeters are marketed by Particle Technology, a demonstration that the involvement of private companies in a common research project is an essential requirement from an economic point of view.

- Heating systems threaten the indoor environments where cultural heritage objects are preserved. The EC project “Friendly Heating” focused on the study of the internal microclimate and the response of wooden artefacts to temperature and humidity forcing, the advection and diffusion of indoor air masses, the transport and deposition of airborne pollutants, the simulation of the convective cells over the benches, and the human benefit under different conditions. The construction and set-up of the heating prototype was successfully achieved.

What, in Italy and internationally, are the best examples of the use of technology to improve access to and understanding of cultural objects?

17. The environment-materials interface that normally imposes stress on the cultural heritage is poorly understood. This area of research has yet to be articulated, mapped and researched, particularly with regard to non-destructive analytical techniques or micro-sample analysis that are a fundamental part of conservation ethics.

18. It is known that changes are taking place in the composition of the atmosphere and in the resulting impact of multipollutants on the environment and land. Cultural heritage is particularly vulnerable to such changes. The results of the EC-financed CAMEL project, wound up in 2003, showed that carbonaceous particulate has now become the main damage factor on architectural and archaeological heritage. Measurements performed in a number of European cities (Milan, Rome, Paris, London and Seville), both in the atmosphere and on monuments, have proved that the blackening of surfaces is increasing and is attributable to automobile traffic. The data were obtained thanks to an innovative methodology for the measurement of the carbon component in stone materials, monitoring campaigns in the proximity of monuments (eg Milan Cathedral and S. Maria del Fiore in Florence) and assessments of the visual perception of monument blackening by the public (tourists and inhabitants). It has also been demonstrated how the composition of the damage layers responsible for the blackening of the architectural heritage is changing, which imposes the need for suitable cleaning techniques. The results achieved underscore the urgency of adopting air quality thresholds that are compatible with the preservation of the Cultural Heritage, in order to avoid irreversible damage, escalating restoration costs, and the gradual disappearance of our monuments under a cloak of blackness.

How can the contribution of SET to conservation be used so as to enhance public engagement with and the understanding of science?

19. Combining Science and Cultural Heritage should be the best way to engage citizens and enhance their understanding of the benefits of applied science. Cultural heritage, as an integral part of the life of European citizens cannot be ignored, since it provides economic advantages that are not as yet matched by other continents.

20. For example, the recent disaster in the USA has undoubtedly increased public awareness of how the impact of global climate change can affect people’s lives. Concerning the contribution of SET to conservation, a challenging issue is the impact of climate change on cultural heritage and, within this subject, the understanding of science can make an important contribution. Climate change over the next 100 years is likely to have a range of direct and indirect effects on the natural and material environment, including the historic built environment. Important changes will include alterations in temperature, precipitation, extreme climatic events, soil conditions, groundwater and sea level. Some processes of building decay will be accelerated or worsened by climate change, while others will be delayed. While the impacts on individual processes can be described, it is difficult to assess the overall risk posed by climate change on the basis of currently available data. Linking global changes to the response of material surfaces of archaeological and historic structures remains a challenge. All gaps existing in evaluating the effects of global change on the built heritage at European scale have been identified and will constitute a basis of the work programme developed by the EC Project “Noah’s Ark”. Climatic parameters crucial to the damage of materials and structures comprising the cultural heritage are to be considered in the framework of available future scenarios. Climate Risk Maps and a Vulnerability Atlas for heritage managers to assess the threats of climate change in order to visualise the built heritage under future climate scenarios and model the effects of different adaptation strategies are under development.

* For the purposes of this inquiry, the term “cultural heritage” includes buildings and other important artefacts, works of art, books manuscripts, records and archaeological remains (both on land and in water) but not townscapes and landscapes.

Bologna, 10 February 2006

Memorandum by the V&A

How is conservation science, in the UK and internationally, co-ordinated between museums, universities and other organisations?

The V&A Conservation Department collaborates with a wide range of organisations, sharing information and skills informally, for one-off projects and through organised research and training programmes, it has a wide network of links to UK universities and an extended link with academic organisations outside of the UK.

The Department has a well-established Science Section, which consists of a team of eight (inclusive of one PhD student) mixed professionals (chemists, material scientists, preventive conservator and physicist), who are engaged in the care and study of the collections of the V&A. This breadth of professional expertise also provides network contacts into academia and industry.

The V&A has a mixed material collection of art and design, which are unrivalled in their scope and diversity. This leads to an equally broad range of queries and questions regarding materials and their associated appropriate display conditions and degradation processes. The team is fully involved in conservation science and in partnerships with conservators in conservation research. They are only partially involved in the conservation process (as advisors rather than conservators).

The V&A recently listed 46 universities and further education colleges where there are significant links; the Science Section has eight formal UK university links and three “heritage” organisations that are active at present. Outside of the UK there are a variety of formal links made through programmes such as the EU framework activities or similar actions.

The V&A Conservation Department, in conjunction with the Royal College of Art, runs a programme of post graduate learning and research. The programme is delivered in association with Imperial College. The course aims to develop both specialised practitioners who will influence the conservation profession and research workers with the ability and curiosity to explore conservation’s multidisciplinary nature. Students on the course are hosted by the V&A and other organisations, for example, Historic Royal Palaces, English Heritage, the Natural History Museum, the Horniman Museum and the Museum of London.

Associations with universities such as Imperial College, and Loughborough (including jointly supervised PhD students) open up access to the expertise and equipment of Material Science Departments. This assists in the understanding of deterioration processes and subsequently to the development of new conservation treatments.

There is no central or formal co-ordination of conservation science between different bodies. The V&A (through its staff and as an institutional member) is an active member of the Institute of Conservation Science (ICS). We were involved throughout the establishment of this organisation and one member of staff (Prof Graham Martin) was the first chair of the Institute. The ICS arranges an active meetings programme both nationally and internationally. There are also a number of Conservation-based organisations which act as formal or informal networks of communication and collaboration including; Icon, ICOM-CC, ICCROM, IIC.

Is conservation research adequately funded, and is it directed at the right areas? Does the UK possess the capacity and skill base to maintain its cultural heritage for future generations?

To place the V&A activities in context, a total of £1 million (based on 2002–03 and 2003–04 figures) is spent on research of which £457,500 was science (including visitor evaluation and market research). This year, the Conservation Department will enjoy the equivalent of £3,400,000 per annum of external conservation science and research funding (UK and EU funding).

Conservation science research is undertaken through GIA, though the majority of this is project-lead; the research is specific and project orientated (as opposed to having a national or strategic focus) and each period of research is short.

Where external funding through government agencies is secured, funding agreements generally last between three and five years with no guarantee that additional funding will be available at the end of the time period to develop the research to the next stage. Long term ageing studies therefore are rare. In addition when funds are secured the work is often delivered through contract staff, who leave the organisation (and often the heritage sector) at the end of the contract period.

This affects conservation science and research nationally in that there are few prospects for permanent employment and limited opportunities for succession planning and career progression. This restricts opportunities to progress and build upon conservation research. However, in 2006 the V&A achieved

Academic Analogue status and can now apply to the Arts and Humanities Research Council giving us a direct route to funding. Other funding opportunities for the heritage sector, in the future may come via the Office and Science and Technology who are encouraging more interdisciplinary research.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage, and to assist in its conservation?

Conservation training has changed significantly over the past 10 years; some conservation courses eg Durham, have closed, and of those that remain where once students were taken at graduate level and received in house training in both theoretical and practical conservation under close and impartial supervision, now conservation is taught almost exclusively at post graduate level and there is an increasing use of internships to provide practical experience. Whilst this can be very instructive there is a danger of a lack of consistency in the depth and range of training that students receive. It is possible for a student to receive a qualification in conservation without having any practical experience of treatment.

With regard to conservation scientists; there are a growing number of combined degree courses and fewer of the pure science graduate and post graduate courses. It is becoming more difficult to attract these latter staff to work in the heritage sector as they are valuable elsewhere in industry and can dictate higher rewards. There is therefore a decrease in “pure” science skills that we have traditionally called on in the past.

There are known gaps in the current level of conservation expertise;

- The V&A/RCA MA Conservation Course is recognised for the quality and relevance of its unique approach to post graduate learning in conservation. Since 1989 this partnership in education and training has provided advanced and specialist learning to maintain high level conservation skills to work on national collections;
- For conservation science there is only limited opportunity to rectify the skill shortage, since no courses exist per se and science sections are not in a position to train at graduate/post-graduate levels in pure science. Joining forces with higher education to pass on knowledge and share expertise offers some solution to this dilemma;
- Informal networks exist between organisations in the UK and internationally which enable students and staff come to an institution such as the V&A for specific and specialised training in aspects of conservation. Internships and skill sharing ensure that practising conservators and conservation scientists can increase their professional knowledge. Funding, though government initiatives such as “Millennium; Sharing Skills Project’ did facilitate the sharing of knowledge across the sector;
- Initiatives such as the ICON HLF Bursary system will fill some gaps in the short term, though there is a need for more long term funding if skills are to be developed and sustained for the future.

Is there a satisfactory process to develop practical applications of conservation research for the market?

The V&A has participated in and continues to participate in trans-European projects that are funded via the framework initiatives of the EU. To date the V&A has produced an innovative pollution dosimeters, a light dosimeter (now marketed under the name of Lightcheck), developed with a commercial company the OCEAN system of radio telemetric temperature and relative humidity monitors along with giving “end user” feed back to potential systems. We are presently involved in the development of two instruments for use in assessing the state of collections under two separate projects. This is all undertaken in the spirit of goodwill and particularly addresses the role that the nationals must play in leading the sector. However, structure and funds do not always make this an easy process.

The imperative for publicly funded heritage organisations to meet higher government targets of Access, Inclusion and Diversity and International Tourism requires the department’s work to be focused towards exhibitions loans and displays. This leaves little time for new and innovative research into the collections.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology, and the part they play in our cultural heritage?

Yes. As the V&A’s science team has an active programme of engagement with public. Typical examples are continued participation in the Royal Society of Chemistry initiative “Chemistry at Work” events (involving hundreds of school children), through V&A based gallery talks, through to summers school activities, through participation in the British Association science activities. Every time we do this there is very positive feedback and the overt comment that the recipients want more.

Conservation science is used as the basis of a Teacher's resource "Museum Conservation" on the On-line museum, V&A Web site¹² and highlights how this applied science is directly relevant and applicable to people's daily lives and experiences.

In what ways can IT contribute to enhancing public engagement with objects of cultural importance, without compromising their conservation?

Is there scope for improving the use that UK galleries, museums and others make of such technology?

What, in the UK and internationally, are the best examples of the use of IT to improve access to and understanding of cultural objects?

The primary focus of our efforts to enhance public engagement with our objects using IT is by providing access to all our collections information via the Internet and multimedia activities in galleries, study areas and on hand held devices. Through use of a Service Orientated Architecture and the development of an XML common data model for cultural heritage known as VIA, the V&A Information Architecture, we provide access to rich content including catalogue information, contextual information about the cultures that created the objects together with high quality digital photographs, audio and video from our Digital Asset Management System.

The V&A web site has established itself as one of the major museum sites that encourages and incorporates contributions from visitors. If cultural sites are to remain vital and useful they have to start thinking of themselves as two-way channels of communication. We hold millions of objects and employ world experts on our collections and new technology is increasingly, and should be, one of the main means of telling people what we know about the things we care for.

However, there is more to it than that. People expect to participate. Amazon recognises this with its user reviews and lists, and Flickr and eBay would not exist without user-generated content. Cultural institutions can learn from these hugely successful sites. At the V&A we have been building our functionality so that visitors can upload opinions on Ossie Clark, images of their knitting, or exercise their creativity designing tiles. We have experimented with on-line conversations with curators, invited people to share their experiences of buying design objects and we are currently contemplating podcasting as a two way activity. The focus is always on the collections but we are using technology to broaden the way different people can engage with and enjoy and learn from our collections.

Memorandum by Dr Paul Whitmore

1. My name is Dr Paul Whitmore, and I am Director of the Art Conservation Research Center at Carnegie Mellon University, a position I have held for the past 18 years. I have been asked by several colleagues in the UK to submit some comments addressing the questions posed in the Call for Evidence for the House of Lords inquiry. My knowledge of conservation science in the UK has been gained through reading of the published literature from those activities and my personal contacts with many of the researchers. As a result I do not consider myself an expert on the UK landscape, but rather as something of an outsider. However, much of my testimony will have bearing on conservation science more generally, for there are parallels between the UK scene and the international one. I do consider myself much more attuned to US conservation science, mainly through my participation in a current effort to obtain increased support from the National Science Foundation in the US. In evaluating the state of conservation science in the US, of its current funding needs, and of its wider benefits beyond the care of cultural collections, I feel I am in a good position to offer comment on some of the questions posed in the House of Lords inquiry. My perspective is a personal one, and I will mainly draw upon the analogies between the US conservation science and the broader UK and international scene. I am not experienced in the Information Technology area, so I will decline to offer an opinion on those questions.

How is conservation science co-ordinated between museums, universities, and other organisations?

2. Conservation science comprises a number of different activities. A major focus of conservation science is analysis of artifacts to determine their material composition and construction and to diagnose conservation problems. These findings then spawn more in-depth research into the materials, their aging, and possible stabilization and repair methods. There are also investigations into developing other analytical methods to study the artifacts. These deeper investigations are often undertaken in academic or industrial laboratories

¹² <http://www.vam.ac.uk/school—stdnts/schools—teachers—resources/conservation>

that have specific expertise and resources to engage in very technical work, and this work is usually conducted on surrogate materials rather than on the artifacts themselves. Finally, the findings of the in-depth investigations are applied to the art objects, with scientists tailoring the proposed conservation treatments to individual objects and monitoring them for the effectiveness or adverse side-effects. It is convenient to think of conservation science activities as analogous to medical practice: the clinical identification of condition and disease; laboratory development of candidate treatments for causes or symptoms; and the cautious clinical application of cures.

3. With that scope in mind, museums tend to employ conservation scientists who are studying the artifacts, either on the diagnostic end or in the application of preservation or repair treatments to art objects. There are a few museum laboratories (the National Gallery, Tate Gallery, and British Museum in the UK) that also have resources to pursue the more fundamental research and development as well. More typically, however, the in-depth research is done by academics or experts in industry, often in collaboration with conservation scientists who can direct the research toward realistic and useful objectives. These alliances between conservation scientists and outside experts are usually formed as a research need in conservation arises, and conservation scientists seek the needed expertise in academia or industry. Occasionally an outside expert will produce research findings or will develop tools that would be of use in the museum world, and then that academic or industrial scientist might seek a collaboration with a conservation scientist to begin adapting the technology and testing its use on artifacts. In the vast majority of cases, the contacts that are made are simply personal connections that have little formal path or precedent. As a result, there is very inconsistent utilization by conservation scientists of existing expertise and technology, either because they cannot find a willing expert collaborator or because they are unaware of the existence of the critical advice or technology. Similarly, academic research does not take full advantage of the direction and focus that could be provided by addressing “real world” problems encountered in museums, libraries, archives, or historic sites.

4. This situation is very similar to that in the US, and efforts are being made to increase the interactions between conservation scientists and outside experts. Working through professional societies such as the American Chemical Society and the Materials Research Society, symposia have been organized that focus on art and archaeological material studies. Conservation scientists have occasionally convened other expert meetings and workshops that focus on specific art problems or technology needs. These efforts raise awareness of the needs in conservation and also facilitate contacts between conservation professionals and outsiders who may have expertise or technology that can help, as well as an interest in seeing their innovations applied to maintain cultural property. It is fair to say that the majority of the most innovative advances in conservation have been the result of this sporadic connection with expertise in related areas in academia and industry.

5. Currently there is an effort in the US to persuade the National Science Foundation to become more engaged with conservation science research, particularly to provide project funding that will strengthen the tenuous ties between conservation scientists and academic scientists. In addition to the clear advantages in bringing more technological expertise and innovation into conservation, conservation can be a subject that will engage the interest of students in science and illustrate the beneficial applications of scientific findings to the general public. Both of these are important components of the NSF's core mission.

Is conservation research adequately funded?

6. Conservation science in the UK, as in many other parts of the world, is not adequately funded compared to the scale of the problems posed by the maintenance and repair of cultural properties. The shortage of funding is reflected in the very small number of scientists studying artifacts within cultural institutions and engaged in collaborations in universities and industries. Even large collecting institutions have only very small scientific staffs, if any at all. For example, the British Museum and National Gallery have very small scientific departments, and the British Library has only within the last two years established a scientific activity, composed of a single scientist. These scientists employed in cultural organizations are solely responsible for the diagnostic and clinical research in the treatment of their collections. While the work produced by these dedicated staff scientists is generally excellent, there are still only a very few workers, and consequently only a very small number of conservation problems can be addressed. The field also suffers substantial upheaval when a scientist leaves it and when a new scientist enters, for there are few opportunities for training and mentoring the advancement of younger scientists and for passing on some of the expertise of the more experienced ones.

7. Because of the natural limits on the funds that cultural institutions can invest in science, particularly in the specialized, long-term investigations, the involvement of academic and industrial scientists has become an essential mechanism to increase the effective manpower in the field. These collaborations allow the study of more problems, bring in expertise in specific scientific areas, allow the possibility of in-depth study over many

years, and expose young scientists to conservation science so that occasional job openings in the field can be filled more easily.

8. Unfortunately, the project funding that is needed in order to sustain these outside collaborations is only occasionally available. In the UK the NERC has occasionally supported academic projects related to conservation, but these have not, it seems, been part of regular programs dedicated to conservation. The sponsorship of the European Union, through its fifth and sixth frameworks which explicitly allocated research funding for conservation science, has been particularly effective at forging alliances of conservation and outside experts, and these teams have made substantial progress in a number of important research areas. The EU support not only resulted in research advancements for the field, but it has also begun to fundamentally change the nature of conservation science in Europe. A critical mass of investigators is being created, and these colleagues can complement each other and begin to address the multidisciplinary problems that conservation tends to pose. The involvement of European academics has brought greater student and postdoctoral activity into the field, and conservation science has begun to be viewed in Europe as a more mainstream endeavor that can be a productive career for a highly skilled scientist. The targeted EU investments have truly transformed conservation science in Europe, and those engaged in EU-supported projects have become leaders in their particular research areas. Unfortunately, while the EU does plan to continue supporting some educational activities in the field, the substantial investment in conservation science research may not be continued in the EU. It would not be surprising to see some of these gains gradually reversed as the outside scientists move on to other funded projects.

9. This same shortage of funding for conservation science has been recognized in the US for many years, and the same obstacles are faced by the very small number of conservation scientists in the US. The US government has generally supported conservation science through the laboratories established in the large public cultural institutions, such as the National Gallery of Art, the Library of Congress, the Smithsonian Institution, the National Archives, and the National Park Service. A small number of private philanthropies also have contributed to the support of the field. In particular, the A W Mellon Foundation has taken a central role, and it has recently been funding the creation of new science positions and postdoctoral fellowships in museums. The Foundation has also sponsored the establishment of a museum-academic collaboration between the Art Institute of Chicago, the Materials Science Department of Northwestern University, and Argonne National Laboratory. Despite these strategic investments, project funding dedicated to conservation science is still lacking, and as a result the conservation-academic alliance remains tenuous and sporadic. In recent years the pressures on the budgets of federal agencies and cultural organizations have made it very difficult to support increased investment in conservation science. In fact we have seen severe cutbacks in some organizations such as the Smithsonian Institution and the National Park Service, who were once leaders in the field.

How does the UK compare with other countries in the application of cutting-edge science and technology to monitor the condition of our cultural heritage and assist in its conservation?

10. It is probably safe to say that for the areas in which UK scientists are engaged, they are among the world leaders in the field. The environmental risks to collections and the monitoring and management of those risks; the analysis of artifact materials, particularly of European paintings and archaeological objects; the digital imaging of artifacts/in all these areas UK scientists are in the vanguard. However, the needs of collections are far greater than the coverage that can be provided by the very small number of UK conservation scientists. So, for example, the UK is not in a leadership position in addressing needs of paper-based collections, or stone stabilization, or stained glass conservation, simply because there are few workers engaged in those areas in the UK.

11. Long ago conservation seems to have accepted that there will be inevitable gaps in the research, and some areas will see little study because the need is not urgent, or because they are not the immediate concern of the institutions employing the scientists. Practically speaking, one cannot reasonably hope to become the leader in the study of every subject. It is important, though, to recognize the areas that are likely to be of greatest concern to those cultural organizations in one's own vicinity, particularly if those conservation needs may be peculiar to those organizations, and scientists in other lands may not be motivated to do the necessary research. So, for example, US scientists would be wise to study the historical artifacts of the American space program, for it is unlikely that those will be studied by investigators elsewhere. In this vein, conservation scientists in the UK have done a reasonably good job in focusing their energy and resources on conservation problems that are of greatest impact for UK collections. But one should perhaps be asking, is the UK conservation science activity covering all of the subjects that are of primary importance to UK collections? While I do not have the answer to that question, it would not be surprising to learn that there are important issues that are not being addressed simply because there are too few scientists to go around.

12. It is quite another matter to pose the question in the other direction: are UK innovators ensuring that those technologies that could be of use to conservation are being introduced to the field? That is much more difficult to assess in some sweeping manner, for innovations are, by their nature, leaps across boundaries. A researcher studying petroleum may discover textile dyes, so one suddenly finds coverage of an area that may not have been planned. In this regard, conservation is probably no different from any other applied field: there are probably many technology innovations for which the conservation application has yet to be discovered. This is the fundamental issue of increasing the efficiency of technology transfer, which is the subject of the next question.

Is there a satisfactory process to develop practical applications of conservation research for the market?

13. The transfer of technological advances into and out of conservation continues to be very difficult. In large part this derives from the small scale of the conservation market for innovative products and services: the potential sales in conservation may not allow companies to recover the cost of developing products for the field. Conservation applications tend to impose peculiar constraints, so that technologies must be adapted and tested for their safety when applied to artifacts. Consequently, innovations that have only a conservation market, such as mass deacidification of books, take many years to be commercialized. Promising candidate technologies have been abandoned because of the lack of development funds and the cautious adoption of them by conservation.

14. In the US technology transfer has been an important objective of government investment in science. The National Center for Preservation Technology and Training, part of the National Park Service, has provided limited funds for technology development and adaptation for conservation needs. Private sponsors, such as the Getty Trust, have also invested in the development of specific technologies of interest to their conservation staff. Still, most technologies require substantial investment to reach viability for conservation application, and that level of sustained funding is not commonly available unless there happens to be a larger market for those technologies.

Could better use be made of conservation science to improve public engagement with and understanding of science and technology and the part they play in our cultural heritage?

15. Because of its obvious impact and ultimate societal value, conservation science is a subject that naturally connects the public to science and technology. Museum exhibitions, articles in newspapers and magazines, and television programs have all been used to tell the technical stories behind artifacts/determining their authenticity, reconstructing fragmentary artifacts or revealing objects obscured by accretions or age, the use of artifacts to learn about the artists or societies that created them. These stories have generally proven to be very well received by the public and to connect them both to the objects and to the science that reveals their secrets. Students who have been exposed to this subject tend also to become much more engaged in the science because of its clear application to the real world, the appeal of beautiful works of art, and the intellectual challenges posed by the detective stories that arise from technical analyses of them.

16. In the US this use of conservation science as a vehicle to reach students and the public has natural appeal to potential sponsors such as the National Science Foundation, which has this outreach as part of its core mission. The NSF has recognized the value of this subject to engage students, and it is currently supporting workshops that provide training to educators at all levels to help them develop courses that teach the science of art. A postdoctoral fellow has recently received support from NSF to pursue a materials science study that is related to conservation. At the present time conservation scientists in the US are attempting to persuade the NSF to invest more in this area, to increase the exposure of students to the field, and to get them engaged more deeply by participation in conservation science research projects.

13 February 2006

Memorandum by the UK Resource Centre for Women in Science Engineering and Technology

The UK Resource Centre (UKRC) was established in September 2004 by OST/DTI to increase the participation and position of Women in Science, Engineering and Technology (SET) employment across industry, academia and public services within the UK. This is to be achieved by providing information, advice and knowledge co-ordination, delivery of and co-ordination of funding, services for employers, services for women specifically women returners, initiatives for graduates, consultative services, informing and progressing of strategy and policy.

The UKRC is responding to the request for information on whether better use could be made of conservation science to understand public engagement with and understanding of science and technology, and the part they play in our cultural heritage. We make the following observations:

- Science and Technology is a traditionally male-dominated sector and remains so today with only 24.1 per cent of the SET workforce being women and just 12.5 per cent of all managers in SET being female. The work of the UKRC is therefore vital to breakdown the gender stereotypes around employment in SET and open up opportunities for more women to participate in SET. All initiatives within the scientific arena however should have a responsibility to ensure that there is a gender balance in the world of science that they portray, and initiatives that come from government even more so.
- Alongside the current lack of numbers of women in science, there is also an invisibility around women scientists historically, yet they have made great contributions to the world. Many have been forgotten, yet can be found well illustrated in the book “Scientists Anonymous, Great Stories of Women in Science” by Patricia Fara. The stereotypical view that women are not able to be scientists is therefore reinforced by this invisibility. The UKRC is currently launching a collection of photographs of modern inspirational Women in Science as one contribution to achieving visibility for women in this area, and providing a cultural legacy.
- An important motivator for both women in SET and young girls entering SET is having appropriate role models. There are currently too few women scientists that are widely recognised and the communication of conservation science therefore provides an additional platform for this.
- Examples of where the UKRC would like to see interventions are:
 - Plaques commemorating the achievement of women scientists and engineers.
 - Features/documentaries/literature recognising and acknowledging women’s contributions to UK cultural sites such as Waterloo Bridge and Nottingham Castle.
- The UKRC would urge the committee therefore to ensure that excellent women scientists are featured in any dissemination of information and would be pleased to offer any assistance that might be required.

13 February 2006
