

Member meeting: Exploring the benefits and challenges of investment in heritage science infrastructure

Friday 28 January 2022, 14.00-15.45 (virtual meeting)

Chair: Lucia Pereira Pardo

This event, hosted by the National Heritage Science Forum (NHSF) Research Working Group, celebrated the recent enhancement of Heritage Science research infrastructure. This development supports the Research Working Group's key outcome of physical and digital infrastructure so that research takes place across the United Kingdom.

Prof. May Cassar, co-convenor of the Working Group, welcomed attendees and provided context for the meeting noting its connection to the [Strategic Framework for Heritage Science in the UK](#) and wider infrastructure developments. Six speakers presented 'lightning' talks on infrastructure projects supported by grants from the Capability for Collections Fund (CapCo) of the Arts and Humanities Research Council (AHRC), which alongside the European Research Infrastructure for Heritage Science (E-RIHS) and Integrating Platforms for the European Research Infrastructure on Heritage Science (Iperion HS) schemes, has contributed to significant enhancements in UK heritage science infrastructural capabilities in recent years. Speakers described the infrastructure projects supported by the CapCo grants, their benefits for their organisations and beyond, and challenges encountered in installing, managing and resourcing new equipment and facilities.

The 'lightning' talks were followed by a panel discussion with Q&A from participants.

Speaker 1

Dr Lora Angelova (Head of Conservation Research and Audience Development, The National Archives)

This talk described the use of CapCo funding to improve the analytical capacity of The National Archives (TNA), nearly all of which is non-invasive or non- or micro-destructive.

CapCo funding enabled TNA to upgrade its multispectral imaging system, purchase a Raman microscope and a vibration-proof table, as well as several smaller investments in analytical capacity. This investment has yielded benefits across the organisation, promoting both intra- and inter-organisational collaborations, and increased the visibility for Heritage Science and Conservation Research, enabling the case to be made for increasing not just equipment and facilities, but also staff numbers.

New equipment will be used for four AHRC-funded projects:

- AI for DIGILAB: A New Concept in Digital Infrastructure for Heritage Materials Research, February 2020 – January 2022
- From Lima to Canton and Beyond: An AI-aided heritage materials research platform for studying globalisation through art, February 2021 – February 2024
- Digital approaches to the capture and analysis of watermarks using the manuscripts of Isaac Newton as a test case, February 2021 – August 2023
- Capturing the Materiality of the Prize Papers. A set of 19th century textile samples from Canton and Batavia as a case study, March 2022 – August 2022.

All four projects are intensely collaborative, including work with both institutional partners and local Chinese and Indian community centres.

Staff numbers will be expanded from April through the addition of a new temporary research post focused on collaborative research requests, to put the Archives' analytical capacity at the disposal of archives and libraries. The intention is for this temporary post to be extended and made more permanent.

Delivery of new instruments from the European Union in the context of both Brexit and the COVID-19 pandemic was a significant challenge. New equipment also requires an increased budget for maintenance and servicing, unexpected maintenance costs, training and X-ray safety costs, software updates and training due to staff turnover. The Archives are exploring creative approaches to cost mitigation, including training collaboration and funding maintenance and servicing costs through external loan requests.

These ongoing costs, and the need to finance them in the long term, were a consistent theme throughout the talks.

Speaker 2

Dr Constantina Vlachou-Mogire (Heritage Science Manager, Historic Royal Palaces)

This talk focussed on CapCo-funded equipment upgrades in the Historic Royal Palaces (HRP) Heritage Science Laboratory, located at Hampton Court Palace, under the Conservation, Collections Care and Collections Management team. Set up thirty years ago to investigate historic textiles, it has since diversified its research across Heritage Science.

HRP was allocated £974,000 at the end of February 2021, to replace outdated equipment and expand its research infrastructure with a state-of-the-art laboratory. New equipment was purchased for analysis, examination and condition recording, and material characterisation and ageing. Consequently, HRP now has a good balance between non-invasive, portable equipment and fixed laboratory equipment, and has also been able to install a new server for archiving scientific data.

The laboratory upgrades have substantially expanded HRP's capability for holistic analysis of its heritage assets and will assist its pandemic recovery by enabling insourcing of previously

outsourced analytical work. New capabilities also enable HRP to create high-resolution digital assets for public engagement.

HRP hopes that these upgrades will attract further research funding, support the next generation of scientists and promote diversity through the HRP Heritage Science Scholarship.

Meeting tight deadlines during lockdown, with many staff furloughed, was a considerable challenge. Despite suppliers experiencing delivery delays, 80 per cent of equipment was received within a month, by the end of March 2021, in accordance with the grant terms. These issues with tight deadlines and the pandemic were a common issue across most of the talks.

Setting up a modern, state-of-the-art laboratory within the Tudor palace provided its own challenges. Electrics, networking, flooring, redecoration and furnishing were completed by the end of April. Most of the work was completed by mid-June, although electronics supply chain delays in India necessitated a six-week extension of the project until the end of July. Financial reporting was completed by the end of October.

Speaker 3

Daniel Bone (Head of Conservation, Ashmolean Museum)

This talk concerned the University of Oxford's CapCo bid for Technologies for Gardens, Libraries and Museums (GLAMTech). Gardens, Libraries and Museums (GLAM) is a division of the University, comprising the University's museums, the Bodleian Library, the University Botanic Garden and Arboretum. The bid also involved the Research Laboratory for Archaeology and the History of Art, as well as external partners.

GLAMTech received £908,000 in CapCo funding to upgrade and replace equipment. Investments ranged from replacements and upgrades of basic equipment to acquisition of more advanced equipment. Emphasis was placed on collection-friendly equipment, with the intention of expanding use of non- or less-destructive processes.

Investment has enhanced the status of Heritage Science research within the University, enabling new opportunities for research and both internal and external collaboration. The day-to-day level of technical work in GLAM has improved, while portable equipment has reduced the need to transport collections. New equipment has also enabled GLAM to work more efficiently, adopting practices such as pre-scanning and mapping. In addition, new imaging and mapping results provide more accessible public resources.

The new equipment has already been useful for a major European Research Council project on the colours of William Burgess's Great Bookcase, the results of which have been used for podcasts and publications, and will also feature in a major exhibition, titled *The Colour Revolution*, at the Ashmolean in 2023.

Tight deadlines were once again a challenge, particularly within the University's purchasing systems. It would also have been preferable to take longer assessing modifications needed for space than was possible within the timescale set out for the funding.

New equipment has created greater demands on staff for maintenance. Expenses associated with the new equipment, including warranties, have necessitated developing funding models for the future and a sustainable long-term plan.

Speaker 4

Prof. Adam Gibson (Deputy Director, UCL Institute for Sustainable Heritage)

This talk discussed the CapCo project at UCL, which brought together multiple university departments. The funding was used to upgrade hyperspectral imaging systems, held in the Institute for Sustainable Heritage, and portable handheld X-ray fluorescence analysers, held in the Institute of Archaeology. Both were in high demand but becoming obsolete.

New equipment has had numerous impacts, partly due to the prestige associated with CapCo. A new EPSRC CASE PhD student was co-funded by the supplier of the hyperspectral imaging camera. The investment has also driven new collaborations within UCL, across a wide range of departments, including with less obvious partners, such as Medical Physics, as well as external collaborations, including with HRP and museums in the UK. The new equipment has also contributed to new grant applications regarding multimodal imaging and moisture in buildings, and is being used as part of UCL's teaching, including several MSc projects.

Installation and training during Covid were challenging, as the project's main supplier was in Scotland, requiring navigation of differing restrictions. Funding for technicians to manage, and staff to use the equipment is needed. The lack of funding for overheads disincentivises departments to apply for equipment-only grants. It is essential to develop sustainable funding models for sharing equipment with other users in the long term.

Speaker 5

Dr Rebecca Stacey (Head of mass spectrometry facilities, Department of Scientific Research, British Museum)

This talk focussed on the improvements to the mass spectrometry facilities at the British Museum (BM), which are situated in an underground part of the building constructed for scientific work.

CapCo funding enabled the BM to replace and upgrade their oldest piece of equipment, which was over twenty years old and still in regular use, but no longer supported by the manufacturer and at high risk of system failure. This was replaced with new equipment, of a substantially higher specification, enabling more accurate and sophisticated characterisation of materials. A new server has been used to connect all the mass spectrometry instruments and connect them to the museum IT system, providing automated secure data storage and

archiving. This is a significant advance in accessibility, enabling the mass spectrometry facilities to easily and securely share data, and offline working with data in different locations, benefiting both students and staff. The BM was also able, using CapCo, to make the technician role for the mass spectrometry facilities permanent.

Investment in the BM's research capabilities has a range of beneficial impacts. The new equipment is used on international projects, for student training, for analysis of artefacts to better inform exhibitions, to learn more about the items in the museum's collections, to create opportunities for collaboration and as a catalyst for funding applications.

The BM experienced similar challenges to other institutions with the tight timescale imposed by the funding conditions, while the interdepartmental cooperation required for the laboratory refurbishment has strengthened the museum's organisation.

Speaker 6

Dr Lisa Brown (Archaeological Science Manager, Historic Environment Scotland) & Dr Aurélie Turmel (Conservation Science Manager, Historic Environment Scotland)

Historic Environment Scotland (HES) is an Independent Research Organisation and Accredited Museum Organisation which cares for, promotes and protects Scotland's historic environment, taking care of over 300 sites in Scotland with over 47,000 listed buildings.

HES aims to better and more sustainably care for and develop its sites by better understanding them, and it conducts research in order to achieve this. It was being held back by outdated, obsolete and unsupported equipment. HES applied for CapCo funding to upgrade equipment for four teams across the organisation.

Equipment funded by CapCo has enhanced HES materials analysis, 3D imaging and aerial survey capabilities. HES is using new equipment to conduct a programme of tactile condition surveys on over 200 of its properties, to assess and analyse the deterioration of high-level masonry and provide a scientific underpinning for future management decisions. Materials analysis is helping to develop a materials database for HES properties to support conservation. Other equipment is being used to facilitate drone support to access and scan potentially unsafe areas of structures.

New equipment is also being used in HES's project *Eternal Connections*, which seeks to stimulate discussion and creative practice around the heritage of Scotland's Muslim community. The project centres on a fragment of a twelfth- or thirteenth-century Islamic glass drinking vessel found at Caerlaverock Castle, a unique find within Scotland. Through this project, HES aims to engage and work with a community not traditionally associated with Scotland's heritage to find new understandings of contemporary and historic connections between Scotland and Islam, and explore the community's heritage.

Update from Tao-Tao Chang, Head of Infrastructure, AHRC

An update was provided on AHRC's intentions regarding future investment in a distributed infrastructure for Heritage Science and Conservation Research, with a hub outside of London and the Southeast, as well as future CapCo opportunities.

Q&A

The Q&A session centred on details of future AHRC funding opportunities, with particular attention devoted to future CapCo calls, and the relationship between funding for research infrastructure and funding for digitisation of resources.

AHRC needs input from those it funds to secure further investment in heritage science infrastructure – both stories and statistics on internal and external impacts are important to demonstrate the wider value of the investment. For example, how the funds have been used to support specialist suppliers (economic benefit) or how they have enabled smaller organisations to access facilities, are definite positives.

Closing remarks from Carl Heron

The meeting has enabled useful reflection and sharing of experiences. Hopefully the increased research capacity resulting from this funding opens new opportunities for collaboration. It was good to see at least one story from outside London and the Southeast, as a reminder that it was not just these already privileged regions which received CapCo funding. Thanks to the speakers for sharing their experiences.

The speaker presentations are available online at: [Heritage science infrastructure | National Heritage Science Forum](#)