SCIENCE MUSEUM GROUP

ANNUAL REPORT

RESEARCH & PUBLIC HISTORY
2016–2017

Cover: Medical Research in a sound-proof room. This photograph, from NSMM's Daily Herald Archive is emblematic of our Bradford Museum's new emphasis on sound as well as vision, a feature also of our annual research conference.

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FOREWORD

TILLY BLYTH

Head of Collections and Principal Curator

Welcome to our third Research Annual Report, covering the academic year 2016–2017. This year sees the Science Museum Group's research hitting its stride across the breadth of our activity and our museums in London, Bradford, Manchester and York.

Our academic conferences and workshops are really putting us on the map. The complete list we feature within is testament to the range of topics where we have found common cause with colleagues in the universities and other museums, from robot futures and architectural Brutalism to the challenges of representing the trauma of World War One. The second Annual Research Conference was held at the National Science and Media Museum last November (strictly beyond the reporting year, but of it). Here, in addition to staff and students talking about their current research, we had a special theme of 'sound and vision', which allowed the museum to show off its new subject focus and to look towards major permanent galleries.

Our collaborative doctoral programme now features a regular crop of graduations, and so it is a great pleasure for us to be able to feature reports from our alumni, this year from students studying electronic music, germ culture and chemicals in the home. Bergit Arends provides a retrospective of the programme's first five years and you will also find listings of all the doctoral projects under way, funded by the Arts and Humanities Research Council and co-supervised by our university friends and colleagues. The Wellcome Trust is generously funding secondments for its postdocs and doctoral students to work in SMG Museums, and the first of these made significant contributions to two exhibitions in the year under review. This year also saw the beginning of three significant research projects: of the National Science and Media Museum's potential audiences; of science in early-modern London, and; knowledge exchange on SMG's energy collections.

At the same time, Robert Bud's project on the meaning of applied science is reaching maturity, so we have included a progress report here.

Virtually all our research activities are carried-out in collaboration – with other museums and with university colleagues. If you'd like to join in, then please get in touch (contact details at the end); we'd love to hear from you.

ENABLING A RESEARCH CULTURE: THE WORK OF THE SCIENCE MUSEUM GROUP RESEARCH DEPARTMENT

TIM BOON

Head of Research and Public History

Research is often a long-term business. This is obviously the case when we want to apply funded academic research in a linear 'R&D' model to the narratives and content of galleries and exhibitions. Here the cycle of project conception, grant application, consideration and (where funded) execution of the research will generally take several years. That is an anticipatory sense: we are always having to ask ourselves, what must we do now so that research will be beneficial in the future. But there is also a retrospective sense: to look back on the work we have done, often opportunistically, and to see how it has organically grown into something of value.

Our work on sound and music is a good case in point. When the Science Museum programmed a live performance of Brian Eno's music for Apollo – to mark the Moon landing's 40th anniversary in 2009 – we did not know that this would be the root of an enterprise that, eight years later, would be feeding into our thinking about not only a temporary exhibition on science, technology and music under development at our museum in Manchester, but also permanent galleries on sound and vision at the National Science and Media Museum in Bradford. Along the way there have been several more concerts exploring the relationships of music and technology, an exhibition and book of essays on electronic music, a research network, a conference, two doctorates, a special issue of an academic journal and a special section of our own journal. All along the way, we have grown a network of participants and publics who now see the Science Museum Group as an organisation that does interesting things in music.

This approach represents a model for how to develop research activity in a way that is appropriate to a public organisation: producing public outputs as it organically pursues its research questions, creating a public for the galleries and exhibitions that will ultimately be created drawing on its findings. It is a model that we will be applying in new areas as we look forward to the new displays that will grace the Group's museums in the decade from 2020.

The projects and activities that feature in this third annual report may be seen in the light of this framing of the long gestation of research. Our conferences and workshops are intended to bring together people with interests in particular areas, whether that be our research community finding common ground away from their 'day jobs' in their research interests or, for example, historians of museums delighting in the similar histories of museums of science and of ethnography at the Evolution of Museums workshop.

Equally, the selection of collaborative doctoral projects under our AHRC funding demonstrates development as we have learned and applied reflection on the kinds of project that best benefit the students and the museums and archives in our CDP consortium, not to mention the broader community of those studying and supervising CDP projects across heritage organisations and universities. In a similar way the *Science Museum Group Journal* continues to grow, experimenting in forms as it benefits from – and contributes to – SMG's wider community of curators and scholars.

It feels appropriate at this stage of SMG's research journey actively to combine the forward-looking and retrospective perspectives to develop what we do. During the composition of this report we have been developing a new SMG Research Strategy which aims to do just that; I will report on that in the next issue.

SOUND AND VISION:
THE SECOND SMG RESEARCH CONFERENCE

MICHAEL TERWEY

Head of Collections and Exhibitions,
National Science and Media Museum

To mark the rebranding and renaming of the National Science and Media Museum, the 2017 Science Museum Group Research Conference explored the theme of 'Sound and Vision in Science Museums'. It was the second annual Research Conference and showcased work from across the Science Museum Group, our partners and our collaborators in institutions of higher education.

A strand of the conference explored sound in museums, reflecting the new focus of the National Science and Media Museum on image and sound technologies. James Mansell from the University of Nottingham opened the conference with a thought-provoking presentation on the different ways of hearing in museums, and Alcina Cortez from the New University of Lisbon shared her research on the presentation of music in museums. Other speakers in this strand included James Mooney from the University of Leeds on practice, use and modification of objects of sound and music, and Stefania Zardini Lacedelli from the University of Leicester on the new challenges for museums in the post-digital age. We were also treated to a talk on the audio interfaces and transport collections held by the Museum of Portable Sound from the joint winner of the *Science Museum Group Journal* Writing Prize 2017, John Kannenberg.

Other papers reflected the diverse and expanding culture of research across the Science Museum Group, with a series of presentations by members of Group staff on subjects relating to the history and practice of the Group and our collections. Tim Boon spoke about scripting the post-war Science Museum, and Cate Watson gave a fascinating talk about the earliest permanent displays in the Science Museum. More contemporary museum practice was discussed in presentations given by Antonio Benitez on the Hooked on Music project at the Manchester Science Festival, and Emma Stirling-Middleton on sound and vision in the Science Museum's new Medicine Galleries. There was more of a focus on objects and collections in the presentations from Bob Gwynne from the National Railway Museum and Alice Cliff from the Museum of Science and Industry, and the audience were delighted and entertained by clips from the rich and varied film archives at the National Railway Museum on which Angélique Bonamy gave an overview. Objects and collections were highlighted in presentations given by Ian Christie of Birkbeck, University of London, who gave an object talk on one of the stars of our collection, Robert Paul's Theatrograph, and James Mooney, who gave delegates the chance to view objects from the Science Museum's Hugh Davies collection.

Research in the Science Museum Group is not confined to our curatorial teams, but is also being undertaken in other departments, and the conference heard lightning talks into aspects of museum practice from members of the Conservation and Learning teams at the National Science and Media Museum.

Three-dimensional electricity demand chart, c.1954.

Live debate: Fake News on Trial.

To mark the rebranding and renaming of the National Science and Media Museum, the 2017 Science Museum Group Research Conference explored the theme of 'Sound and Vision in Science Museums'. It was the second annual Research Conference and showcased work from across the Science Museum Group, our partners and our collaborators in institutions of higher education.

There were further insights too into the work of our cohort of collaborative doctoral students, with papers and contributions from Rebecca Smith, Paul Coleman and Phillip Roberts who, as well as a paper on his research into the collections at the National Science and Media Museum also gave an entertaining magic lantern performance that brought the objects and their histories to life.

During the conference there was also a range of other performances and activities for delegates to enjoy. John Ellis from Royal Holloway, University of London, and his team of retired television engineers from the ADAPT project, set up and demonstrated the technology of a 1960s live television broadcast in the museum foyer. Following a round-table discussion on the curating of exhibitions on contemporary and challenging topics, delegates were invited to a reception for the opening of the museum's *Fake News* exhibition. During the evening there was a unique and special performance from the artist Sam Hertz, in collaboration with the Dare Partnership between the University of Leeds and Opera North, whose installation *Shadow Feeling* allowed us to experience the sounds and resonances of the museum building itself, as pink noise was played through the IMAX auditorium's sound system.

The 2018 Research Conference will take place at the Science Museum in London from 14 to 17 September. It will be part of the biennial conference of the European Society for the History of Science, and will be organised in collaboration with the British Society for the History of Science, with the active collaboration of the Department of Science and Technology Studies at University College London. It will be a further opportunity to build on the success of this year's conference, and showcase the richness, depth and diversity of the expanding research culture of the Science Museum Group.

CONFERENCES ACROSS THE YEAR

DATE	TITLE	DESCRIPTION
2–4 October 2016	Artefacts	Understanding Use: Science and Technology Objects and Users The Artefacts conferences have for two decades been bringing together museum curators and university researchers from across the world to discuss the histories of scientific and technical objects and their place in museums. The conferences aim to stimulate far-reaching and in-depth research on the material culture of science. Every year has a theme; in 2017 it was Understanding Use. Conference speakers extended to the museum context the 'users' theme that has featured in Science and Technology Studies over the last decade or so, showing how it can open-up new approaches to objects and display. (This conference was described in last year's Annual Report).
20 October 2016	The Wounded	Workshop with 'Wounded' exhibition feedback group
28 October 2016	Manchester Science Festival performance of new score for 'The Building and Operation of Industrial Museums'	'The Building and Operation of Industrial Museums' is a silent film made in 1928 as part of a campaign to build a science museum in New York. The composer Jean-Philippe Calvin wrote a new score for the film under a Leverhulme Trust artist in residence award in 2016. The film shows Europe's four great science museums in London, Paris, Munich and Vienna as they were in 1927. On 28 October, Manchester Science Festival hosted the first festival performance (the premiere was at the Artefacts conference ten days beforee).
3 November 2016	ABTEM Annual Conference	The Association of British Transport & Engineering Museums, a non-profit-making group, exists to provide a forum for the discussion of matters of common interest to transport and engineering museums and to provide a means of representing their views on issues of national and regional concern.
19 November 2016	Concrete Hopes and Fears	As part of the AHRC's 2016 'Being Human' Festival of the Humanities, the Science Museum held an event under the title 'Concrete Hopes and Fears', which explored whether the material should be seen as 'friend' or 'foe'. Architectural modernists have gloried in concrete's capacity to enable new structures such as Lubetkin's cheerful penguin pool at London Zoo or the domineering swagger of Erno Goldfinger's Trellick Tower. But the totalitarian aesthetic of brutalism-by-concrete has divided opinion in places such as London's South Bank. Disasters such as that at Ronan Point in 1968, or the Bison system's failures, have piled unease on top of dislike. An event associated with a potential future exhibition on concrete.
19 January 2017	The Wonders and Challenges of Human Space Flight	In exploring the many dimensions of human space flight, this two-day event focused on the culinary, ethical, medical, psychological, and sensory affects of space on humans. It heard from psychologists who advised NASA; from doctors preparing astronauts for missions on the International Space Station; and from chefs and food technologists about crafting food to enjoy in space. Philosophers and neuroscientists spoke about the changes that occur in the mind and the body of astronauts as they gaze at earth from orbit. The workshop considered the challenges of spending years in space on a future Mars mission, and whether a one-way mission to Mars would be ethically acceptable.
27 January 2017	Concrete Brutalism	Evening event organised by Royal Holloway Department of Geography under the title, 'Brutalism Redux: Resuscitating the urban politics of brutalist architecture', an event associated with a potential future exhibition on concrete.
5 April 2017	Humphrey Davy workshop	Free public talk and workshop at the Science Museum Letters and the Lamp: Sir Humphry Davy, 1778–1829 In 1815, Sir Humphry Davy invented a miners' safety lamp that later revolutionised coal mining in Britain, Europe, and beyond. The safety lamp was a source of controversy, however; others laid claim to its invention, and a bitter public dispute ensued. In this talk, Professor Sharon Ruston (Lancaster University) explored some of Davy's private letters, the majority of which will be published for the very first time in 2018. After the talk there was a more informal workshop over refreshments, run by Dr Andrew Lacey (Lancaster University), to discuss some of the issues raised in Davy's letters.
16–17 June 2017	Metropolitan gallery workshop	London 1600–1800: Communities of Natural Knowledge and Artificial Practice See report: this issue
14–15 July 2017	Evolution of the museum	Universal Histories: Universal Museums See report: this issue
8 August 2017	Robot Futures: Vision and Touch in Robotics	Robot Futures: Vision and Touch in Robotics This symposium brought together engineers, scientists, cultural theorists and artists who work in the field of robotics to explore notions of embodiment, telepresence and virtual and augmented realities.
31 August 2017	Post Office conference	'The British Post Office in the Telecommunications Era' conference was organised by our own CDP students. It explored many different and surprising sides of the British Post Office during the telecommunications era (1870–1975). Talks ranged from its takeover of the UK's telegraph network to the privatization of British Telecoms. Papers covered four themes; Gender, Serving the Nation and Empire, Network and Military, in which historians from a range of disciplines and backgrounds came together to illustrate the vital but often unacknowledged roles that this institution played in twentieth century society. A final round table featured Professor Graeme Gooday, University of Leeds, and John Liffen, Curator of Communications, concluding the day of presentations.

EVOLUTION OF THE MUSEUM WORKSHOP

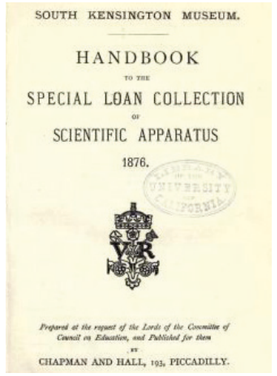
SANDRA KEMP

Ruskin Library and Research Centre, Lancaster University

Today's museums are defined by the collections they hold. Researching the origins of these collections enables curators and historians to appreciate their meanings and to build deeper understanding of their potential for display and for new lines of research. The Evolution of the Museum workshop on 13–14 July 2017 combined collections-based and archival study at Blythe House and round-table presentations, debate and discussion at the Dana Research Centre to explore how understanding complex interrelations between knowledge histories and museum histories might inform future museum developments.

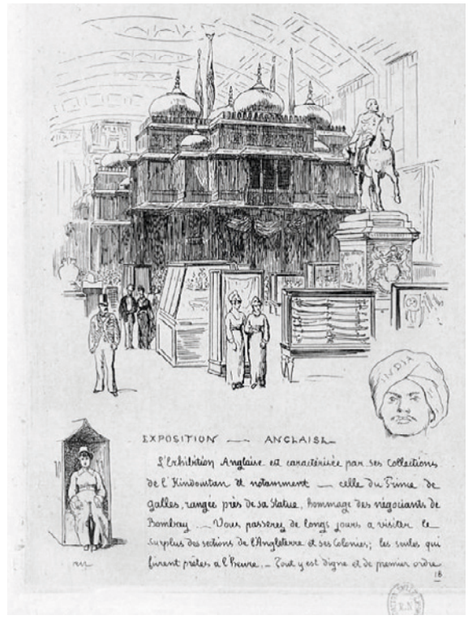
This workshop was the first of four interrelated events in London and Paris from the Universal Histories and Universal Museums: A Transnational Comparison (UHUM) research project (universalhistories.org) led by Sandra Kemp and Hervé Inglebert, and funded through the AHRC's Care for the Future and the LABEX Pasts in the Present: History, Heritage, Memory schemes, in the UK and France respectively. The project is a partnership between museums and universities: the V&A, Science Museum, Pitt Rivers Museum, Musée de l'Homme, Musée du quai Branly, Musée des Arts et Métiers and the universities of Lancaster and Paris Ouest Nanterre La Défense.

Sandra Kemp (project Principal Investigator) opened the workshop with an introduction to two of the UHUM project case studies. The first of these was the 1876 International Loan Collection of Scientific Apparatus at the South Kensington Museum (SKM), which marked the growth of interest for a science collection in London and highlighted the development of scientific disciplines. This collection contributed to the separation of the SKM's collections into science and art, and ultimately led to the emergence of two different institutions, the V&A and the Science Museum. The second UHUM project case study was the Universal Exposition at the Musée d'Ethnographie du Trocadéro in 1878. The Musée d'Ethnographie du Trocadéro first opened its doors in 1882, building on a series of older ethnographic collections, some of which date back to the prerevolutionary period. The workshop methodology was underpinned by transnational comparison of the history of the development of museum collection and display practices, and their reception in London and Paris between 1851 and 1914.


SOUTH KENSINGTON MUSEUM.

HANDBOOK
TO THE
SPECIAL LOAN COLLECTION
OF
SCIENTIFIC APPARATUS
1876.

Prepared at the request of the Lords of the Committee of Council on Education, and Published for them
BY
CHAPMAN AND HALL, 193, PICCADILLY.


EXPOSITION — ANGLAISE

Far left: Handbook of the Loan Collection of Scientific Apparatus, one of the project case study exhibitions.

Left: The Indian Palace in the Champs de Mars during the 1878 International Exhibition, 'L'Exposition Universelle 1878. Lettre illustrée', Paris-Gravé, 1878, p21.

Below left: Tim Boon demonstrates the pyrophone (fire organ), one of the objects from the 1876 Special Loan Collection of Scientific Apparatus. This international meeting featured simultaneous translation from and into French.

Tim Boon (Head of Research and Public History, Science Museum) led the collections-based presentations, showing some of the objects that were loaned to the SKM in 1876 for the collection of scientific apparatus, including objects relating to the standardisation of weights and lengths, as well as pitch, tone and metre. Christopher Marsden (Senior Archivist, V&A) showed material – including a range of stunning photographic albums – documenting the construction of the SKM and its early exhibitions. Sandra Kemp and Chiara Zuanni (UHUM project postdoctoral researcher) looked at an Indian writing desk, which was donated to the Prince of Wales during his travels across India in 1875–76 and was subsequently displayed in both London and Paris. All three sessions allowed participants to reflect on a range of theoretical frameworks and methodologies for researching the history of an object and its provenance.

Following the collections-based activities, round-table presentations investigated different aspects of collecting and display practices at the case study exhibitions, and related transnational exhibitions to museums. Contributors from the UK centred on the impact of universal exhibitions on the SKM. Rupert Cole (Assistant Curator, Science Museum) began by tracing the history of the displays of Nairne electrostatic machines from the 19th century until today. Alexander Scott (University of Wales Trinity St David) and Jonathan King (Museum of Archaeology and Anthropology, Cambridge) discussed the impact of the 1851 Universal Exhibition on Liverpool museums, and of exhibition temporary buildings on museum architecture. Roberto Limentani (Laboratoire d'anthropologie sociale, École des Hautes Études en Sciences Sociales) explored the theoretical background of Pitt Rivers' approach to ethnology and museology.

André Delpuech (Director, Musée de l'Homme) led discussion on French museum histories, starting with the history of the Musée d'Ethnographie du Trocadéro. Pascal Riviale (Archives nationales), Séverine Dessajan (Université Paris Descartes) and Magdalena Ruiz Marmolejo (Sorbonne) explored early Trocadéro collections, focusing respectively on Peruvian collections, approaches to display of ethnography and Amazonian collections. Déborah Dubald (European University Institute) drew our attention to the multiple entanglements of collections, stakeholders and buildings that shaped the Natural History Museum in Lyon.

A short tour of the *Making the Modern World* gallery in the Science Museum focused attention again on the ways in which histories are accumulated and transformed through objects in museums and by their reuse under new rationales to suggest new kinds of comprehensive histories. Hervé Inglebert acted as rapporteur, bringing together the key threads weaving together the narratives of UHUM over the two days. The workshop concluded with a work-in-progress presentation of the UHUM online exhibition, prepared from research by team members across the project, by Chiara Zuanni.

This workshop acted as a foundation for two subsequent workshops in Paris which further developed our understanding of the ways in which histories are assembled and transformed through objects in museums. The first, Comparative Museologies: The Example of the Asian Arts, held in Musée de l'Homme on 27 September 2017, explored the acquisition, inventory and display of Asian objects in Western museums. The second, Museum Universalities in Western Cultural Capitals in the Nineteenth and Early Twentieth Centuries, held at Université de Paris Ouest Nanterre La Défense, extended this investigation to museums internationally. Our final project conference will be held at the Musée des Arts et Métiers in Paris on 15–16 June 2018. This will extend the debate on historical definitions of 'universal' histories and 'universal' museums to the present day, bringing together the core themes of the project.

SCIENCE MUSEUM GROUP JOURNAL:
REPORT ON PROGRESS, 2016–2017

KATE STEINER

Editor, Science Museum Group Journal

Since the last Annual Report, we have produced two issues of the *Science Museum Group Journal*. Issue 07 (spring 2017) had the theme 'Sound and Vision' and was published to coincide with the relaunch of the National Science and Media Museum. Issue 08 (autumn 2017) was an extra-large issue and included a mini-collection of articles all addressing experiments in museum practice at the turn of the present century. These issues highlight some interesting developments around the e-journal's growth and future direction.

Themed issues can be powerful; the collection of articles addressing related issues creates greater focus and impact – a whole that is greater than the sum of the parts. In the case of the 'Sound and Vision' issue, the theme allowed publication by internal staff and students at the National Science and Media Museum who addressed, for example, issues of museum policy and strategy (Michael Terwey) and a historical study starting from the museum's magic lantern collection (Phillip Robertss). The theme also demonstrated the relevance to our practice of work by external scholars from disparate disciplines – from the study of sound in museums (Jennifer Rich, James Mansell) to issues around the collection and display of photography (Elizabeth Edwards, Ben Burbridge). The collection illustrates both the expansion of academic work and thinking across the Group, and our ability to publish our own work alongside that of the scholarly community.

Yet issue 07 also illustrated some interesting conundrums. The increased profile of the e-journal externally and the growing pressure to publish out of internal research activity (conferences, fellowships, maturing collaborative doctoral research) has resulted in a great number of submissions generally, and themed issues block the pipeline. The addition of a planned themed issue for spring 2018 (see below) is starting to create a bottleneck. Submissions are having to be held over for as long as 18 months to two years – a common practice in paper journals, but not ideal for an online journal with the potential to turn around articles in two to three months. This could be seen as a pleasant problem to have as it is, in part, a feature of the journal's success. (It is also interesting to note a trend in the field of academic publishing in which authors are favouring the special journal issue over books of collected essays.) While we want to continue publishing related articles together, our editorial response is to experiment more with themed sections of the journal – mini-collections of related articles which speak to each other, but allow publication of unrelated articles at the same time.

This was the solution for issue 08 in which a group of museum directors and senior curators (gathered together by Robert Bud) discuss their experience of experimenting with museum practice at the turn of this century. We think the results show promise and are working with our technical contractors to present these mini-collections more elegantly within the e-journal's information architecture. Collections of papers from the Sensing Time workshop with the V&A and from the forthcoming Wounded workshop organised by our medical curators are both in the planning stages.

Alongside the increase of external submissions (Charlotte Sleigh on science fiction and literature, and Goggins et al. from National Museums Scotland on the display of prosthetics are examples), submissions from staff across the Group are also increasing. Bradford and Manchester have been particularly productive this year, for example (Jan Hicks, Alice Cliff and Sarah Baines from the Museum of Science and Industry and Zoe Wolstenholme from the National Science and Media Museum are all in the process of publication). Curators are increasingly seeing publication of their work as a natural output and show greater confidence in submitting – among them Stewart Emmens, Sara Stradal, Emma Middleton and Elizabeth Bruton. Collaborative doctoral students' research and fellowships such as those supported by Wellcome are rich sources of articles on our practice and collections. We will continue to work to encourage and support staff from different sites and areas of work to submit articles.

In 2016/17 we also awarded the e-journal's first annual Writing Prize. The £500 prize was shared by John Kannenberg – who wrote a theoretically grounded piece on how museums could treat sounds as objects – and Joshua Butt, a collaborative doctoral award student who wrote a detailed study from the archives of a Manchester coach-building company adapting to the age of the motorcar. Both articles, along with a highly commended piece by Jean-François Fava-Verde, were published in issue 08.

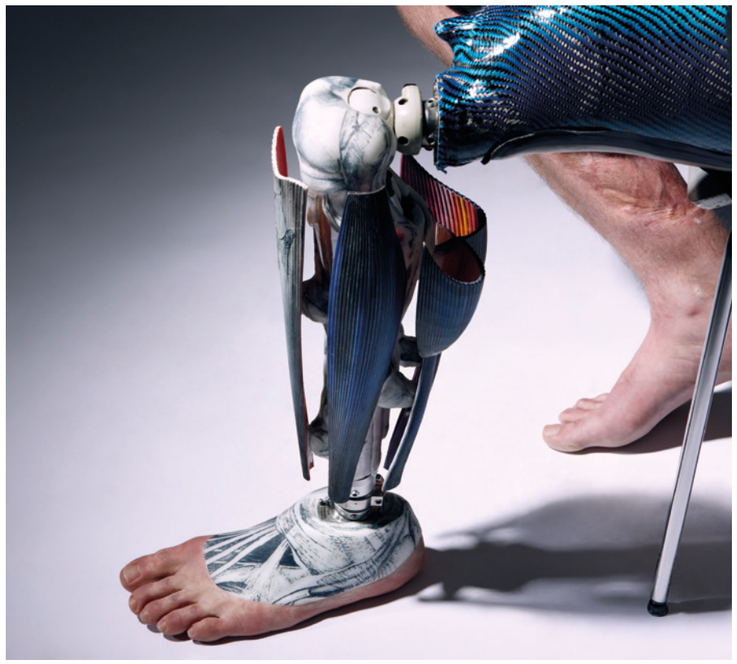
The journal's Editorial Board, with several new members, met in May 2017 and continued to show its active support and offer constructive advice. This year we held a panel of board members (Simon Schaffer, Sam Alberti and Helen Graham) speaking to an audience of around 50 invited staff and guests, with the aim of making this rich source of knowledge and expertise more widely available.

The e-journal continues to seek to be flexible and innovative. This year we appointed Geoffrey Belknap (Curator of Photography at Bradford) to the role of Reviews Editor. His brief was to revivify the reviews section, and he began in issue 08 with an article challenging the idea of what reviews mean for a contemporary online journal.

University of London. Trentmann is interested in the intersection of histories of energy use alongside its material culture as collected and displayed in museums, and this issue reflects these two areas of research and practice. In addition we are looking at a future expansion and relaunch of the journal, most probably to coincide with its five-year anniversary.

From *'A Chamber of Noise Horrors'*: sound, technology and the museum, by James Mansell (Issue 07).

From *Prosthetic limbs* on display: from maker to user, by Sophie Goggins et al (Issue 08)



THE SCIENCE MUSEUM GROUP'S DOCTORAL SCHEME: FIVE YEARS ON

BERGIT ARENDS

Acting Manager, Research and Public History

The arts and humanities research landscape is changing significantly and the Science Museum Group's research landscape with it. Relationship-building between the museum sector and academe is the essence of this change. At its heart is the collaborative doctoral partnership scheme. The scheme gives academic researchers meaningful and structured access to our collections and our expertise.

The change started ten years ago when museums were recognised not only as a public sphere for learning but for what they are at their core: centres of knowledge production and research. The driver of this change and its key funder is the Arts and Humanities Research Council (AHRC). The council started to appreciate the myriad opportunities to undertake research within the museum's four walls. As a consequence, a number of museums, but also galleries, libraries, archives and heritage bodies, became entitled to become designated as Independent Research Organisations (IROs). The Science Museum Group was one of them, becoming an IRO in 2009. With this status the Group became fundable and we have since increased our research activities. Here I look back on the past five years of our collaborations with higher education institutions to support doctoral-level research.

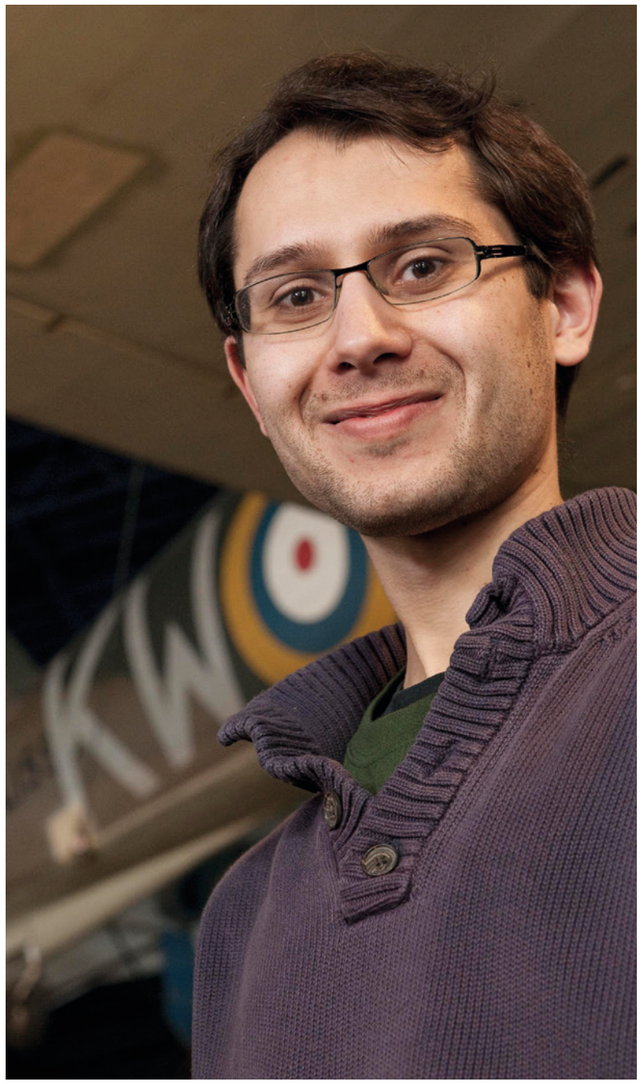
Our doctoral research projects delve into unsung collections, exhibition-making and audience thinking, and develop new methodologies to study our collections' material culture, and their social and technological histories. Research methods extend across the sciences and humanities. Current projects include research into science, technology and road safety in the motor age in Britain during the 1960s and 1970s through collections held at the Science Museum. Another project investigates different healthcare campaigns on cures for nervous disorders, the benefits of tuberculosis screening and the importance of sexual health in 20th-century Britain through collections held at the Science Museum Group and other archives. Historians of science and technology and one of our archivists support the study of models and demonstration equipment of Manchester's Museum of Science and Industry and the role these play in technical education, as well as their role as icons of both industrial heritage and symbols of technological futures.

These and other collaborative doctoral research projects have been supported by the Science Museum Group and have been funded by the AHRC through the partnership scheme since 2013. The scheme builds on a legacy of postgraduate research within the Group, but this research has now become more structured and relevant to us. To further extend our network within the science heritage sector we are currently part of the Science Museums and Archives Consortium (SMAC), comprising the Science Museum Group, BT Archives, Royal Geographical Society (with the Institute of British Geographers) and the Royal Society. The SMAC funding phase started in 2016, with annual funds for six studentships per year confirmed until and including 2019. Facilitated by the programme, each collaborative studentship is jointly proposed by a university-based academic in collaboration with a member of staff at the SMAC. Doctoral candidates are then jointly supervised by subject specialists at both their higher education institution and at one or more of the institutions of the SMAC. Through the programme we are taking the lead in developing a distinctive area of research into science heritage collections and building a highly skilled cohort of doctoral researchers.

The scheme provides an exceptional opportunity for mutual learning. The university researchers get to work with unique, world-leading collections, alongside their counterparts at our museums – experts who bring years of specialist collections knowledge and an approach to material culture, together with experts in collections management, digitisation and audience thinking. Doctoral students access distinct but complementary research environments and benefit from a diversity of approaches with an applied translational dimension. In turn the museums get injections of new thinking from both students and the university researchers. This gives us an opportunity to open up silent collections through the dedicated work of the students.

Sophie Vohra, based at the National Railway Museum and University of York, works on the Trevithick archive at the museum and assists with the recataloguing of the material as part of her project Railways and Commemoration: Anniversaries, Commemorative Cultures and the Making of Railway History. Gemma Almond, from the University of Swansea, investigates a hitherto little-studied collection: the Science Museum's collection of 19th-century spectacles. Through these objects she contributes to a nascent material-medical history of human prosthetics. Gemma contributed her collections knowledge to our review as part of preliminary work for the One Collection project.

Not only do we get to know our collections better, but these research projects also establish links of long-term benefit for both collaborating partners to provide access to resources and materials – knowledge and expertise that might not otherwise have been available. Moreover, our doctoral researchers promote the museums beyond their walls. Several of our students were successful in bringing their research into an international context through the AHRC international placement scheme. Josh Butt (Manchester Metropolitan University) became joint winner of the Science Museum Group Journal Writing Prize with his essay 'Adapting to the emergence of the automobile: a case study of Manchester coachbuilder Joseph Cockshoot and Co. 1896–1939'.



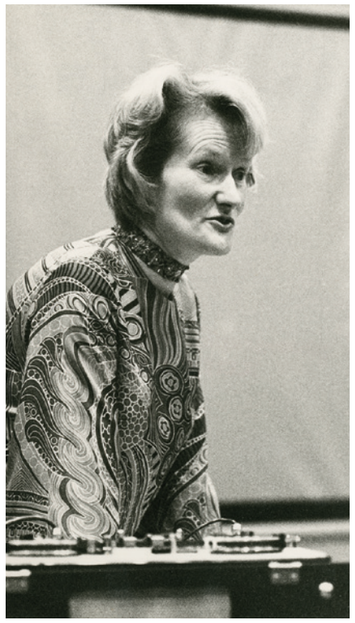
Collaborative Doctoral Partnership PhD student Benjamin Regel worked on the conservation of doped fabric aircraft.

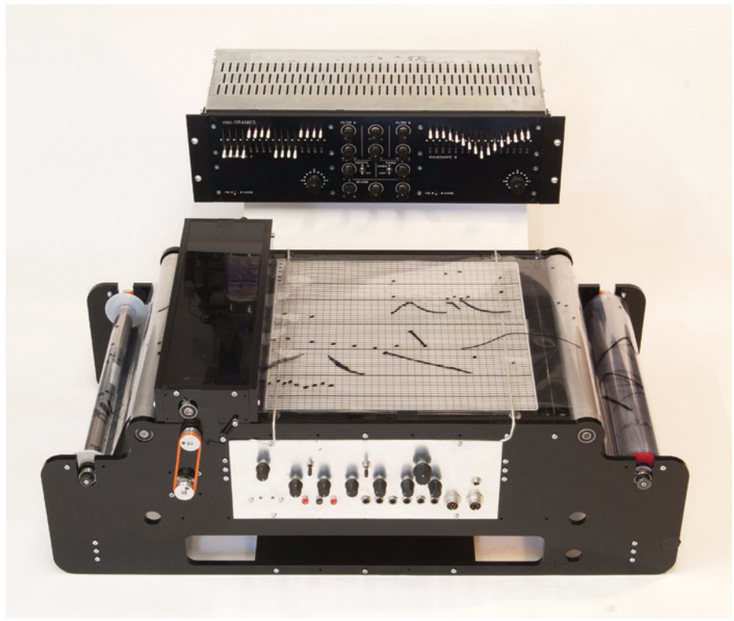
How does the programme support the employability of the doctoral student? Students concluding their research or who were awarded their doctorates this year make headway in their research careers. Jacob Ward has taken up the Douglas Byrne Marconi Fellowship at the Bodleian Library, Oxford, to continue his research into the British Post Office in the telecommunications era. Laura Newman was appointed Research Fellow on the Mobile Museum project at the Royal Botanic Gardens, Kew, to study the mobility of biocultural collections. Following his research at the National Railway Museum, Thomas Spain became a member of staff there. Ben Regel continues to work in the Science Museum's conservation department while finishing his thesis. We are excited about the career paths our students take and look towards developing close ties with our research students to facilitate careers in both the museum sector and within universities.

RECENTLY COMPLETED DOCTORAL PROJECT:
ORAMICS, A PRACTICE-LED INVESTIGATION OF AN ELECTRONIC MUSICAL INSTRUMENT

TOM RICHARDS

Collaborative Doctoral Award PhD student





Left: Daphne Oram giving a presentation at East Surrey College, Redhill, in 1980. Image courtesy of the Daphne Oram Archive, ref. ORAM/07/05/001.

Right: Oram with her Oramics interface, about 1969. Image courtesy of the Daphne Oram Archive, ref. ORAM/07/09/013.

Far right: Mini Oramics reimagined and built in 2016. Image courtesy of the author.

Daphne Oram (1925–2003) was a British composer and innovator whose work and research had been all but written out of history, despite her former status as a leader of the fledgling UK electronic music avant-garde from the late 1950s to the mid-1970s. More recently researchers such as Jo Langton, Tim Boon, Peter Manning and Mick Grierson have brought her legacy once more to the fore, with the *Oramics to Electronica* exhibition at the Science Museum and the accession of her archive into the Goldsmiths library special collections. I was lucky enough to be the recipient of a collaborative doctoral award PhD studentship, working between Goldsmiths and the Science Museum, to further research and contextualise Oram's work, with the specific remit of examining her musical innovations: the Oramics drawn-sound interfaces.

Oram cut her teeth at the BBC between 1944 and 1958. Starting out in a junior technical role, she progressed to become a studio manager, before becoming co-founder of the BBC Radiophonic Workshop. Oram had produced most of the experimental soundtracks that gave rise to the launch of the facility, and yet even as this legendary studio was born, Oram had reservations about staying with the BBC. She was particularly unhappy that she did not receive named credit for her works: she was classed as a technician rather than a composer. She also resented the fact that her exacting specifications for this new studio had been completely ignored by the management and she considered the initial equipment provision to be inadequate. She also expressed regret that there were no opportunities for pure musical research. So in December 1958, with increasingly frequent requests to undertake external commissions, she left the BBC to launch a private studio in Kent.

In her latter years at the BBC, Oram had been researching a new way to create electronic music, one that might supersede the techniques of tape manipulation and provide the composer with a more intuitive interface, where all the parameters of the music could be graphically represented and controlled. In 1962 Oram received a grant of £3500 from the Calouste Gulbenkian Foundation to pursue this research, and with the help of several talented engineers – Fred Wood, Graham Wrench and her brother John Oram – she built this hybrid optoelectronic instrument. In 1966 Oram successfully demonstrated her drawn-sound interface, which she dubbed 'Oramics'.

As my studentship specified practice-based research, I not only closely studied the Oramics Machine which was by now the centrepiece of the Science Museum exhibition, but started to look at ways that I might be able to expand upon the existing knowledge of Oram's work by creating something new. When I studied Oram's detailed notes of the trials and tribulations of her work with her first prototype, it became apparent that despite some beautiful design work and real innovation (winning US and UK patents) the Oramics machine was dogged by technical difficulties. This problem was exacerbated by the fact that by the end of 1966 Oram had parted professional company with John Oram and Graham Wrench. Undeterred and without further funding, Oram started work on a successor: 'Mini Oramics', which she was planning from the early 1970s with the advent of integrated circuit technologies. An almost complete design for her unfinished Mini Oramics Machine exists in the archive – and this design, credited to Daphne Oram and John Emmett, became the basis of my PhD research project.

As no working Oramics interface existed, I thought evaluating and attempting to build this unfinished design of Oram's might provide insight into its feasibility, the quality of the interface and more widely help to speculate how Mini Oramics would have been received had it been brought to market. How might this unusual interface have changed the course of 1970s electronic music?

Rather than building Mini Oramics exactly to the Oram–Emmett design, I assessed the design for potential flaws or problems, and eventually redesigned and built it to slightly revised specifications. Essentially, I imagined that I was a 1970s product developer bringing Oram's idea to market. I used only circuit topologies that would have been feasible at the time, and I tried to make a machine that would work to Oram's conceptual specifications, rather than something that included the minor flaws of the original design.

At the end of March 2016, I finally finished the prototype, and then conducted a small user study to evaluate the interface. The feedback from four professional electronic musicians was overwhelmingly positive. They all enjoyed working with the interface and found it to be a unique composition experience, both in the working method and the sounds produced. Despite it having a few minor technical issues, they all found it to be a very direct and intuitive working process. Since then the project has attracted worldwide attention, featuring on BBC Radio 4, in *The Wire* magazine and at Moogfest in the US, as well as several conferences, festivals and symposiums.

I hope this practice-based research can, to an extent, vindicate Oram's ideas. Oramics has often been compared with much more recent software-based composition systems. When compared to its potential 1970s competitors, Mini Oramics really could have provided a valuable alternative technique for the electronic music practitioner, if only Oram had secured the further backing she needed, and that she arguably deserved.

RECENTLY COMPLETED DOCTORAL PROJECT:
GERM CONSCIOUSNESS IN BRITAIN'S WORKPLACES

LAURA NEWMAN

Collaborative Doctoral Partnership PhD student

My PhD looks at how British workers responded to attempts to create new germ-conscious workplaces in late-19th- and early-20th-century Britain. Approaching this project, it would be natural to assume that fear was the overwhelming reaction that most people had. Today we are surrounded by images and testimonies that stress the ubiquitous dangers of disease germs.

One of the aims of this project was to trace the lineage of the kinds of behaviours we associate today with being germ conscious. How quickly did Victorian and Edwardian workers incorporate techniques such as hand-washing into their daily regimens? What kind of new technologies did they adopt in light of new concerns about controlling infection in the workplace? And how did they learn about germs in the first place? By using the operating theatre and hospital, the post office and the dairy as case studies, we can begin to gain some insight into how and why germs now assume such a critical space in many everyday working lives.

One of the key arguments of my thesis is that we need to understand the workplace as an important site of both formal and informal learning in this period. By looking at the notebooks of medical students as well as the courses offered at agricultural colleges, for example, we can begin to see how workers were taught about germs. Stressing their familiar characteristics and applicability to working lives was key. And it was not all about disease control – in the case of the butter and cheese industry, many were quick to try and emphasise how germs could be useful working tools for fermenting cream. At the forefront of such attempts were a combination of activists, government agents and businesses, all of whom had an interest in teaching workers to be more germ conscious.

Despite the often concerted attention that was devoted to teaching people about bacteria and infection control, one of the most surprising things my research revealed was just how laissez faire many people's responses were to the threat of germs in the workplace. Scientific authority and expertise derived from the bacteriological laboratory had no assured or secure place here; from the operating theatre to the dairy shed, many mounted criticisms of this (relatively) new branch of science. Surgeons argued that gloves deadened their sense of touch and made them more likely to make serious and life-threatening mistakes in the operating theatre. Tuberculous post office employees refused to clean their cutlery because it was 'women's work'. Dairy farmers were unable to wash their hands regularly because it was too expensive to install hot water into their sheds and besides, they argued, there were other ways of ensuring that milk reached the customer clean and free of disease.

What results is an occupational health history that centres the mundane realities of working with germs. Rather than treating germs as exceptional and otherworldly objects, germs were instead often interpreted through the everyday, with a clear and tangible relationship with workers and their workplaces. This helps us to further broaden our understanding of one of the most important chapters in the history of medicine to include new kinds of actors and environments that were impacted through the 'discovery' of minute life.

Collaborative Doctoral Partnership PhD student Laura Newman.

RECENTLY COMPLETED DOCTORAL PROJECT:
USES AND MISUSES OF CHEMICALS IN THE BRITISH HOME, 1930s–1980s

CAT RUSHMORE

Collaborative Doctoral Award PhD student

Domestic ceramic container for bicarbonate of soda.

In January 2017, I successfully defended my thesis at Oxford Brookes University. As a project supported by the AHRC and the Science Museum, my research was partly inspired by the presence and absence of everyday domestically used chemicals in museum collections. In order to look at a variety of activities in the home, and therefore include women, men and children in my research, I paid attention to chemicals used for three domestic activities: cleaning, weeding and photography. I profiled a selection of the chemicals and chemical products used at home, and my focus on user experiences highlighted rich sensory details in addition to the users' practical knowledge. I quickly found that evidence of misusers was far more prominent than evidence of 'ordinary' users because newspapers and medical journals often carried stories of poisonings, explosions and caustic burns. I embraced these themes because between the 1930s and the 1980s interest in accident prevention, household safety and consumer advice increased markedly.

To construct a broad picture of how domestic users obtained and used chemicals at home, I supplemented domestic advice literature, personal accounts and published articles with archived materials, including the trade literature collection at the Museum of Science and Industry which holds training manuals for Ilford's salesmen. The History of Advertising Trust and the Walgreen Boots Alliance Archive provided insights into consumer practices and preferences, the state of the market and details about individual products. At the National Archives, Kew, I accessed files that had been compiled during investigations into solvent abuse, fire extinguishers, caustic chemicals, explosives and pesticide use, which revealed material submitted to regulatory board meetings and their minutes, newspaper clippings and scribbled reactions to them, letters rom concerned members of the public and responses to them, as well as coroners' reports.

Regarding objects in museums, the issue of survival bias was clear. Products associated with hobbies and those in branded packaging were more likely to be attractive, valued, durable, available to be collected and therefore available for research than those associated with the cleaning chemicals I chose to study. Evidence of unbranded chemicals was not always immediately obvious, but it was present in storage containers marked for sodas, for example. Jars for sodium bicarbonate (baking soda) were smaller than those for sodium carbonate (washing soda), which speaks of the volume used as well as how each agent was taken out of the jar: bicarb in teaspoonfuls, as opposed to handfuls of washing soda. In these examples, the containers had become collectable as ceramics made by particular manufacturers and belonging to larger sets of objects.

By taking a broad and inclusive view of chemical use at home, I showed that users are central to understanding why chemical products exist in particular forms. The users in my narrative had agency: they managed risks themselves, and sometimes they circumvented the safeguards that had been demanded on their behalf. Users and misusers shaped the products available in British homes.

MODERN PHYSICS IN THE MUSEUM: WHAT CAN OBJECTS TELL US?

ALISON BOYLE

Keeper of Science Collections

'It has been realised for some time that the Museum has lagged behind in illustrating the development of what is somewhat loosely termed "Modern Physics" or "The New Physics" as distinct from "Classical Physics", and an effort is now to be made to fill up this gap ... Careful consideration has been devoted to the problem of interesting the general public in such an abstruse subject.' Report of the Advisory Council of the Science Museum for the year 1935.

My PhD thesis, supervised by Jon Agar at UCL, explores how modern physics was collected and displayed in the UK over the (long) 20th century. The emergence and establishment of 'modern physics' roughly overlaps with the development of distinct science and technology museums. This provides an opportunity to explore how collections and public representations of science are shaped by a variety of factors including scientists' own narratives of their professional identities, institutional trends and state priorities.

Much of the existing research about physics on display has focused on major public exhibitions such as the 1924 British Empire Exhibition and the 1951 Festival of Britain. Instead, I have chosen an object biography approach. Looking beyond (or behind) the displays allows us to take a longer view away from the particular constraints of individual exhibitions, offering a glimpse into how various publics – in museums and elsewhere – encountered artefacts of modern physics, and showing how collections need to change shape as scientific fields shift.

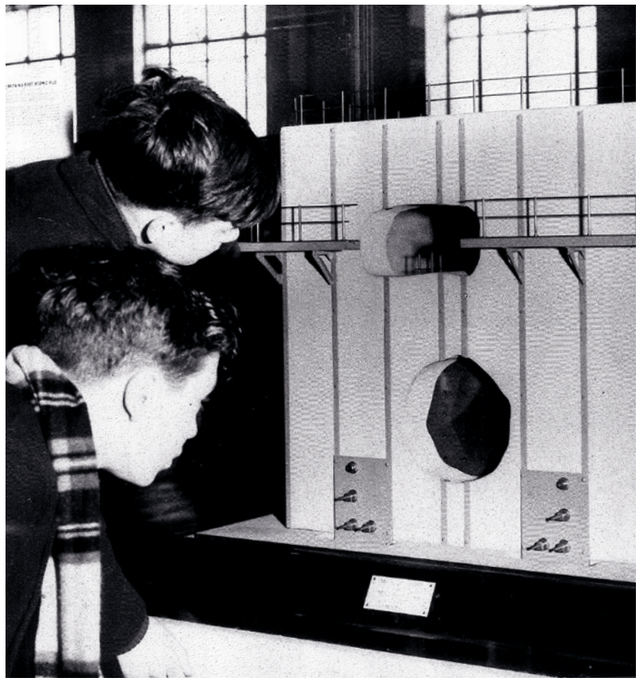
Different sorts of objects tell different sorts of stories. There is the 'icon': J J Thomson's cathode-ray tube, the museological manifestation of the invisible electron. Over a century at the Science Museum it has shifted between different collections as curators endlessly regrouped categories to accommodate emerging fields of science and industry which did not sit comfortably within 19th-century museum classifications; it has variously been interpreted as an emblem of 'pure' research and the foundation stone of a burgeoning electronics industry. It is also just one of at least three objects with a similar claim to fame, a striking illustration of our need to memorialise and simplify narratives of scientific discovery.

Most objects are not so famous. In the Science Museum's D4 hangar at the Wroughton large-object store, you will find a crate tucked neatly under the wing of the Piaggio aircraft. The object inside is a 1949 display model which has not been used since the 1970s, and is inaccurate so might be considered of limited historical interest. But it is its very inaccuracy that makes it interesting. Showing GLEEP, Britain's first nuclear reactor, it was designed to promote Britain's emerging international isotope trade, while maintaining secrecy over the exact nature of reactor designs and experiments at Harwell's Atomic Energy Research Establishment (AERE). Following this commercial success, the AERE used the model in a series of small exhibitions in towns near the site of the planned new Windscale reactor. These were consciously planned to win hearts and minds, 'killing all foolish talk' of safety concerns.

The non-public lives of objects can also illuminate the study of physics via its material culture. On the trail of a 23 cm crystal, we travel thousands of miles through five countries, uncovering decades-long processes of planning, testing and integration: one small component of the Large Hadron Collider provides a microcosm of how 'big science' operates. And what of objects that have sat in museum stores for decades, never accessed? Could what museums do not use tell us as much as what they do?

There are some challenges to taking an object biography approach. When you choose to follow an object's story, you sometimes need to force yourself to stick to the path it takes you along rather than diverting towards other interesting things encountered on the way. But this also takes you down some unexpected paths, and I have found that studying objects and documents in tandem can add texture to the existing historiography, uncovering some aspects that archive studies alone would not reveal. I am hopeful that these object stories, as well as adding to our picture of physics in the 20th century, will show the wider potential of the Science Museum Group's collections for research.

The GLEEP reactor model (in the centre of the plinth) on display in Whitehaven, Cumbria, 1949. Image © Nuclear Decommissioning Authority.



Two schoolboys inspect the GLEEP model for a press shoot at the Science Museum, 1950.

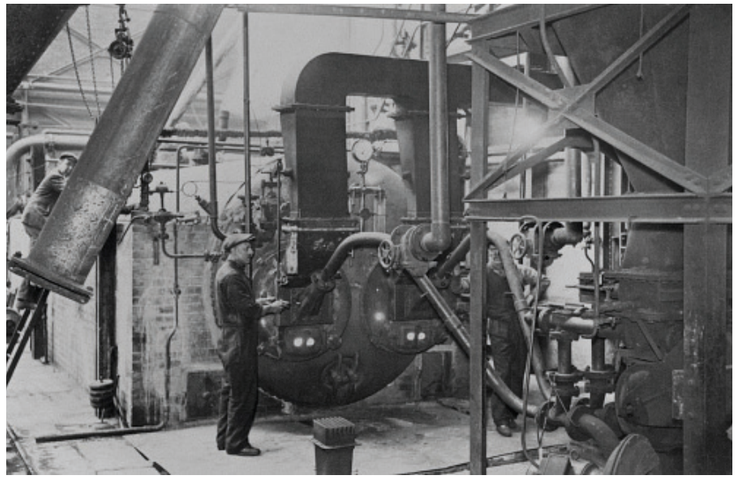
A NEW HISTORY OF APPLIED SCIENCE

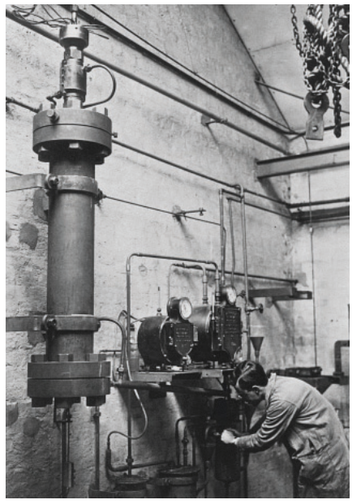
ROBERT BUD
Research Keeper

The concept of 'applied science', the history of which is the current focus of my research, has been a potent topic of debate and tool of policy for some 200 years. It is also used in public debate about science. It links to the culture and experience of the visitor. 'Applied science' is indeed a concept particularly pertinent to the Science Museum. Reaching on the one hand into the laboratory and towards pure science, and on the other into the factory and the home, towards the development of machines for production and devices for living, 'applied science' underpins the scope of the museum. We may take it for granted, but there is nothing natural about the concept and indeed in very recent years its use has faded. So, while this research does not start with individual objects in the museum's collection it explores the reasons behind the aggregation of detectors of subatomic particles with fire engines. Understanding the multiple resonances and meanings of the term over the last 200 years will be a substantial contribution to the museum's own self-awareness; it will help the institution be a more 'mindful museum'.

The challenge has been to develop an approach to the history of science that begins with lay and politicians' categories and to follow the interactions with scientists' teaching and research. This is the opposite to a more traditional trajectory which has begun with scientist's categories and then explored public understanding of these. Since for a century the Science Museum has itself been a node in public talk about science, this research expresses curiosity in a domain which is natural and necessary to the museum, perhaps more so even than to academe.

The term 'applied science' was coined by the poet and philosopher Samuel Taylor Coleridge in 1817 as he drew up proposals for a massive new encyclopaedia. Drawing on the thinking of Immanuel Kant, and of encyclopaedists in Germany, he was interested in helping the bourgeoisie of the early 19th century make sense of the rush of knowledge and experiences that could all too easily feel like chaos. It was however in the university rather than the encyclopaedia that the term found its most influential place as, later in the 19th century, the role of academe in educating future engineers and chemists was debated. The new civic red-brick colleges, later universities, such as Birmingham and Manchester could provide structured teaching which would be both relevant and civilising while not trying to teach the secrets of the trade only learnable on the job. This was a time when Britain was becoming increasingly aware not just of the industrial competition of Germany, but also of the cultural underpinnings of education there.





Left and above: Fuel Research Station in Greenwich, an experimental plant for the conversion of tar into motor spirit, 1933.

The term also had connotations which went much wider than educational philosophy, as it expressed the tenets of progress and the rootedness of a new technological civilisation in the deepest scholarship and highest achievements of the past.

The categories of pure and applied science were crucial to the 1876 exhibition in South Kensington – huge in size and ambition, if temporary – which launched the Science Museum. The 20th century saw a shift of emphasis in science policy to research and once again 'applied science' was deployed and enriched. After the Second World War the term was very widely used, describing the research that could legitimately be supported by public funds for the public good (rather than company-specific interests) until it lost out to 'technology' at the end of the century. In military circles it represented the kind of knowledge which was not secret (as opposed to defence technology, which was). Over two centuries the term had been used to express the meaning and aspiration for that knowledge which stood at the very edge of the public sphere, and linked the most general to the most particular. Naturally this study, while British in focus, has had to deal with multiple influences between countries, both close neighbours and transatlantic challengers.

The outputs will be chapters in a variety of volumes, articles (four have been published and three are in press) and a dedicated volume. Part of the support from the AHRC also went into the organisation of a conference looking beyond science itself to its links with the rest of culture in the early 20th century. For applied science permeated society. It was a term used by James Joyce to characterise the interests of a character in his modernist novel *Ulysses*. In turn this meeting will lead to the publication of a multi-author book edited together with scholars in a variety of fields.

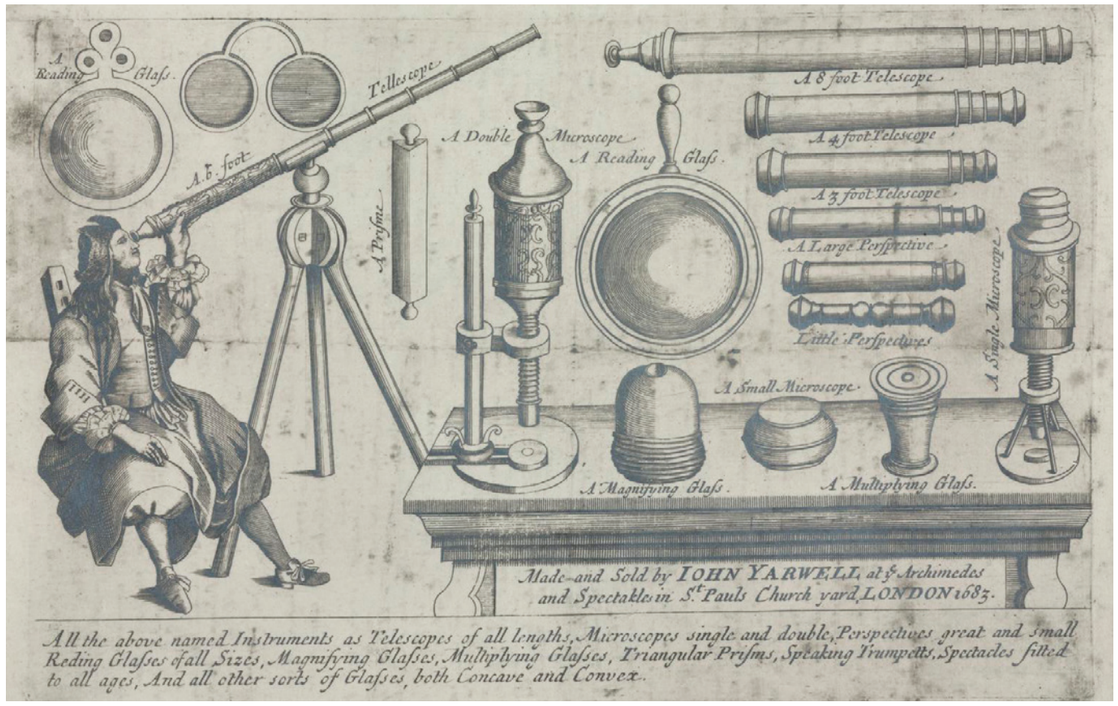
A separate but related project in which the museum is involved, HoNESt (History of Nuclear Energy in Society), is concerned with the historical roots of public attitudes to nuclear power across Europe. From the 1950s the work of the UK Atomic Energy Authority expressed the visions and limitations of applied science more powerfully than any other endeavour. This project is therefore closely connected with the study of the concept itself, as well as enabling the museum to collaborate with European partners. The support of Euratom enabled the museum to recruit a postdoctoral fellow, Dr Stuart Butler, who developed a report on the British experience.

The Science Museum is grateful for support from AHRC grants AH/I027177/1 and AH/L014815/1. The HoNESt project has received funding from the Euratom research and training programme 2014–18 under grant agreement no. 662268.

METROPOLITAN SCIENCE:
NEW RESEARCH ON EARLY MODERN LONDON'S INSTITUTIONS AND CULTURES OF PRACTICE AND KNOWLEDGE

REBEKAH HIGGITT

Lead, Metropolitan Science project, and
Senior Lecturer in History of Science, University of Kent



The Science Museum is a partner in a three-year Leverhulme Trust-funded research project, Metropolitan Science: Places, Objects and Cultures of Practice and Knowledge in London, 1600–1800, based at the University of Kent. This project is exploring some of the practical and commercial contexts for the development of scientific knowledge in 17th- and 18th-century London, including those in which the trade in scientific instruments flourished. The project began in spring 2017 and launched formally with a successful and well-attended workshop in the Dana Research Centre on 16–17 June.

The workshop – London 1600–1800: Communities of Natural Knowledge and Artificial Practice – was programmed by the project's consultant, Professor Jim Bennett, who is Curator Emeritus at the Science Museum. It sought to set the scene for the project by inviting 30 speakers to give short talks that addressed the current state of research on a range of corporations, institutions and less formalised cultures of knowledge and practice. Productively, they were asked to address the nature of their group, its attitudes to knowledge, its production, retention and dissemination, and relationship to other London institutions. As well as launching the project and providing useful context and background for the project researchers and the curators working on the forthcoming London: Science City gallery, the workshop should lead to a journal special issue, with full-length articles on several telling examples from among the many discussed during the workshop.

Over the following six months, the project's researchers have been busy in the archives exploring instrument-makers, guilds and trading companies in greater depth. Both Jasmine Kilburn-Toppin and I began by consulting the archives of the key guilds for instrument-makers, the Spectacle Makers' and Clockmakers' companies. I looked at the Spectacle Makers' Company's leadership and (as far as possible from limited textual, visual and material evidence) corporate identity. This showed that in the later 18th and early 19th centuries, scientific instrument-making, including philosophical and mathematical as well as optical instruments, was promoted by the company over its original craft of making spectacles. This led to confident claims about their significance to the development

of science and national prosperity as well as a clash with the Clockmakers' Company over which had jurisdiction over mathematical instrument-makers, provoked by a test case concerning the optical and mathematical instrument-maker and retailer Robert Brettell Bate.

Meanwhile, Kilburn-Toppin put evidence from both companies together with important social history sources – criminal records (Old Bailey archive) and civic inventories (from the City of London's Court of Orphans) – which has allowed a deeper understanding of the working and commercial spaces of London's instrument-makers across the long 18th century. First, although historiographical attention has focused on large 'proto-factories', such as that overseen by the Troughtons and Jesse Ramsden, this research has revealed that most instrument-makers experienced a fluid boundary between domestic, working and commercial spaces. Thus, observation and knowledge of a broad range of instruments, and demonstrations of such things, were relatively common in early modern makers' households. Second, these sources bring into sharper focus working conditions within workspaces, such as widespread networks of subcontracting, and the high turnover of workers in large establishments. Third, close analysis of the language used in the criminal court materials and company court minutes reveals that even very socioeconomically marginalised artisans employed languages of expertise in describing the design, materials and techniques associated with 'scientific' instruments. Fourth, identifying genuine authorship of instruments was very challenging against the backdrop of an active market for second-hand (and often stolen) objects. New makers and owners frequently erased the (true) maker's name from an instrument and inscribed it with a new or fabricated maker's name.

Noah Moxham has begun with the East India Company's archives, particularly those from the last three decades of the 18th century. He has noted there an increasing sense of the company's need for expertise about India in its London administration, and for scientific expertise on the ground. Instruments, surveyors and botanists were dispatched to India with a view to assessing the potential of the newly acquired territories for new crops and plantations, mineral resources, the physical extent of the company's newly acquired territorial control, and the number of taxable subjects. Maps, charts, specimens, samples and reports flowed regularly in the other direction, as the company sought to process information centrally. The sense of the company's public responsibilities, as the agents of a vast extraterritorial empire, increase during this time, and a sense of the company's contribution to knowledge as part of its commitment to the public good begins to emerge more strongly. This tracks broadly with the company's willingness to lend its infrastructure and personnel to scientific or technical initiatives broached by other organisations, such as the Society of Arts or the Crown.

Some of these very early findings have been shared by the team at the November 2017 History of Science Society's annual conference in Toronto, with a panel on Instruments and Identity: Material Cultures of Geographies of Scientific Instrument Making in Early Modern London. In 2018 we are looking forward to a workshop on material culture in history of science research, a panel at the European Society for the History of Science conference and to working in greater depth with the Science Museum's collections and staff.

More details about the project can be found on its blog at: metsci.wordpress.com.

Far left: Trade card for John Yarwell, St Paul's Church Yard, London, 1683.

Left: Folding bow spectacles of glass, horn and steel, English, 1650–1750.

Above: A scale for calculating interests made by Robert Bretell Bate, 1824.

BRADFORD'S NATIONAL MUSEUM: CONNECTING BRADFORD WITH THE NATIONAL SCIENCE AND MEDIA MUSEUM

LYNN WRAY

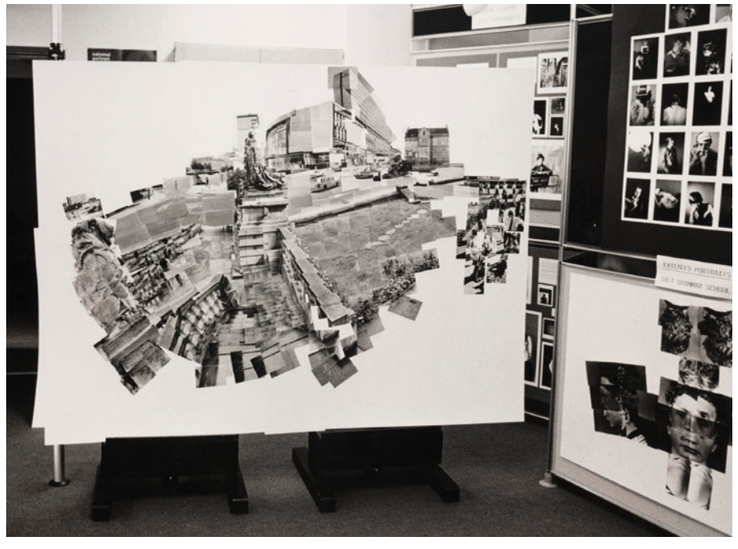
Researcher, Centre for Critical Studies in Museums, Galleries and Heritage, University of Leeds

Being a 'national' museum has traditionally involved the collection and display of objects of 'national significance' and the classification of these objects according to fixed disciplinary boundaries (art, history, science). The rationality of national museums has also been underpinned by a conceptual and financial affiliation to the state and by an assumption that the people it serves are bound by a shared national identity. What does it mean, then, to be a 'national museum' in a world of transdisciplinary innovation, when the boundaries between disciplines are no longer stable? What legitimacy does the 'national museum' have in the era of globalisation, when flows of people, goods, capital and ideas so commonly transcend national borders? How does a 'national' status impact on a museum's international reach and its ability to connect with the people in the place in which it is situated?

These questions lie at the core of the work I will be doing for the next three years as a researcher on a new, AHRC-funded, systemic action research project: the Bradford's National Museum project, which will offer new insight by focusing on the National Science and Media Museum. The project will critically investigate what it means to be a 'national museum' in Bradford – a deindustrialised regional city with a significant history of migration from specific localities in India, Pakistan and elsewhere. The project was born out of a desire within the National Science and Media Museum to understand how the museum can be of use to the city while remaining true to its purpose, its focus on the science of sound and image technologies and its status as part of the Science Museum Group.

Our research team of historians, ethnographers, museum professionals, cultural producers, educators and community partners will use action research methods to explore how these aims can be realised. In the first phase of the project we will test out together how the museum could use its resources to enable people to develop and share stories about their daily lives and their hopes and aspirations for Bradford. We will also use this work to establish a network of community partners and local people that can help the museum to develop its role in Bradford through regular long-term conversations.

Bradford's National Museum will also experiment with how the city of Bradford can be used as an incredible asset: to interpret, give meaning to and enhance understanding of the museum's collections. Central to the project is the concept of 'translocality' – a concept which foregrounds the connections between people in specific local areas across the globe, rather than between national states and capital cities. Bradford exemplifies this concept. For instance, the city has such close ties with Mirpur (a city and region in Pakistan-administered Kashmir where a high proportion of Bradford's Pakistani community originated) that the local radio station Rose FM broadcasts a phone-in programme simultaneously in both cities.

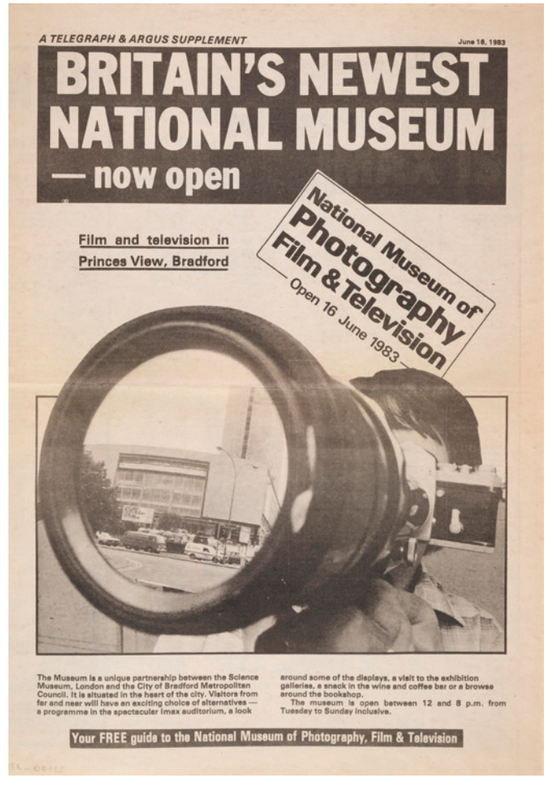


Right (and top right) David Hockney and staff assemble his composite photograph of the museum, 1985. The museum's own history features in the research project.

Far right: Newspaper advertisement for the new National Museum of Photography, Film and Television, 1983.

We will co-produce a series of experimental exhibitions, gallery interventions, oral histories and public broadcasts, to explore how the translocal experiences of people in Bradford could be used to shine a light on the media technologies in the National Science and Media Museum's collections. Can Bradford's special connections to other local places across the globe help to illuminate the role sound and image technologies have played in people's experience of globalisation? Can the ways in which different generations of people in Bradford have used different media to keep in touch with friends and family in other parts of the world, for example, help visitors to understand more about how sound and image technologies help us stay connected?

Keep a lookout in the coming months for the launch of our project website: bradfordsnationalmuseum.org



ENERGY IN STORE:
WHAT OUR COLLECTIONS MEAN TO THOSE WHO CARE

JACK KIRBY
Group Head of Collections

ANNA WOODHAM
Lecturer & Researcher,
King's College London

ELIZABETH HAINES
Researcher

JESSICA BRADFORD
Collections Engagement
Project Manager

Early in 2017 the Science Museum Group was awarded AHRC funding to conduct a 12-month knowledge exchange project called Energy in Store (officially 'Integrating Forms of Care: building communities of practice around reserve collections', grant reference AH/P013678/1). The project brings together a working group of collections managers and curators from across the Science Museum Group, and also enthusiast experts, for a series of discussions around the Group's stored collections on the theme of 'energy'. Although some of the Group's 425,000 objects are on permanent display across the museums, and others will feature in special exhibitions and loans to other venues, most of the collection will remain in the stores for the foreseeable future. We want to consider through this project how to increase the value and mobility of these stored collections, as they represent a vital resource for researchers of all kinds, now and for future generations.

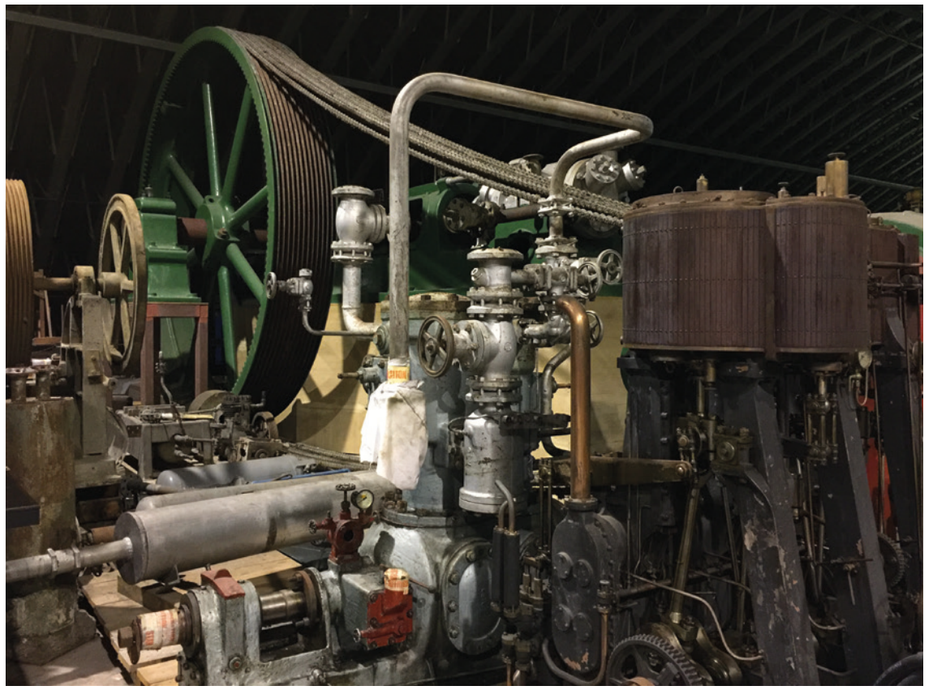
The enthusiast experts involved in Energy in the Store include former and current professional engineers, industrial archaeologists and a model builder, all of whom have different reasons for engaging with the stored collections and offer a range of perspectives and professional experiences. Through their networks and wider activities, the enthusiast experts are also champions for the understanding and preservation of industrial and technical heritage right across the UK. The project aims to better understand the value of stored collections for these communities and to consider methods through which their perspectives, subject knowledge and social networks can contribute to collections sustainability.

Energy in Store stems from an earlier AHRC-funded project called Who Cares? Interventions in 'Unloved' Museum Collections. The Science Museum, in collaboration with staff and academics at the Ironbridge Gorge Museum Trust and the Museum of English Rural Life, explored the significant role that enthusiast experts play in caring for museum collections, particularly those that others may find difficult to engage with owing to their repetitive or specialist nature. The Who Cares? project concluded that although museum staff have a commitment to improving collections access, negotiating a suitable level of physical access and inviting external parties to a play role in decision-making processes around the reserve collections can still be challenging. The next step was to invite the enthusiast experts and curators to collaboratively investigate these issues further.

For Energy in Store, the working-group members are united by a common interest in the history of energy supply and distribution. Until July 2018 we will be meeting at different Science Museum Group stored collections in order to consider the different objects, spaces and practices in each. In early November the group came together for their first store visit to Blythe House. Here we began to explore the roles that stored collections play in enthusiast experts' research practices. The group have considered a broad-ranging set of historic energy-related artefacts: from dummy parts of nuclear reactors to pin badges protesting against the use of nuclear energy; from domestic steam engines to early samples of electro-refined copper. We discussed the contribution enthusiast experts might make towards easing curatorial dilemmas, such as managing extensive collections of similar objects where distinguishing between genuine duplication and small but significant differences is a crucial issue.

Our second group visit in early December was to the Collections Centre at the Museum of Science and Industry in Manchester. Here we explored how a researcher approaches a museum store in both a conceptual and practical sense, for example by considering the value of browsing the stores as a research method and mapping the process of making a request to view a stored object. The project has already indicated routes to improving expert enthusiasts' access to these collections and feeding back the impact of their research activities into the Science Museum Group's ongoing activities.

Facilitating our discussions throughout the project are creative practitioner John Wallett and Aura Films. Together they will be producing a short film that documents our discussions. This very importantly enables us to bring these discussions to a wider audience. The film and other creative outputs will be made freely available on the project website for use by other expert researchers and members of the public. The project will conclude in June 2018 with a public workshop where the working group will present an overall summary of our discussions and mutual learnings, and offer suggestions on how this pilot project could be transferred to other contexts across the heritage sector.



Far left: Science Museum Group collections storage hangar, Wroughton.

Left: Objects in storage – the foreground object is the triple-expansion engine of the screw steamship Flamboro', built 1886.

ENGAGING WITH THE SCIENCE MUSEUM GROUP COLLECTION

In 2017 the Science Museum Group relaunched its online collection (collection.sciencemuseum.org.uk). The new site consolidates several websites publishing digitised collection material into a single presence. Although this project marked a significant step forward in online access to the Group's collection, there is a huge amount more to be done.

The Energy in Store project comes at a particularly important time, as the Group is embarking on a major strategic initiative to reimagine how its collection is cared for and shared with the world. This ambitious project will transform how our world-class collection, most of which is not on permanent public display, is accessed physically and digitally. Approximately 320,000 objects will be relocated from Blythe House in west London to a new purpose-built collections management facility at the Group's site in Wroughton, Wiltshire.

The new facility will be regularly accessible to the public and will welcome researchers interested in viewing particular objects. Most of the 320,000 objects will be catalogued and photographed in a mass digitisation programme as part of the relocation, marking a further step change in online access to the Science Museum Group collection. New ways to discover the collection through visualisation and browse tools, as well as contextual stories and learning resources, will enable new audiences across the globe to engage with the collection.

Left and below:
Science Museum Group collections storage facility, Wroughton.

Left to right: Anna Woodham, Lecturer in Arts and Cultural Management, Kings College London; David Clarke, Senior Mechanical Design Engineer, Thorlabs; Jack Kirby, Group Head of Collections Services, Science Museum Group.

NATIONAL SCIENCE AND MEDIA MUSEUM RESEARCH HIGHLIGHTS, 2016–2017

MICHAEL TERWEY

Head of Collections and Exhibitions,
National Science and Media Museum

In 2017 the National Media Museum became the National Science and Media Museum – a small change but one that reflects the changes that the museum has made since 2012 to more closely align with the opportunities and resources brought by the Science Museum Group as a whole. Our new focus on research is part of this change, and we are pleased to benefit from the support of the Research and Public History team across all aspects of our research activity.

A major success for us this year was the news that the AHRC will fund a major three-year research project exploring the museum's relationship with place. 'Bradford's National Museum: Methods for Refounding "Inter/national" Museums Translocally', led by Dr Helen Graham from the University of Leeds, will use action research methodologies to explore research questions relating to the interaction between the museum and our home city of Bradford, asking what it means for us to be a 'national' museum in the 21st century. This research will directly influence the ways the museum works in the future, and is an excellent example of how research can be central to our practice as museum professionals.

Our collaborative doctoral students continue to bring new thinking to our collections and new attention to the wealth of research potential that they represent. Phillip Roberts, who is working on magic lantern culture in the 19th century, has given talks and lantern slide performances at the University of Cambridge, the technology festival in Hebden Bridge and the Royal institution, as well as editing a special issue of *Early Popular Visual Culture*. Rebecca Smith, whose work focuses on the *Daily Herald* Archive, has talked about her research at the universities of Kent and Lausanne, and will soon have a piece in *History Today* on the ways that the *Daily Herald* picture editors manipulated photographs to fit the news agenda of the day.

A major focus of our research activity over the next five years will be the development of new permanent galleries that showcase our collections of image and sound technology. Our Sound and Vision Galleries will draw on the latest research and will generate new questions and projects. We have established a curatorial advisory group of leading experts in the history of our collections, and in 2017 also hosted the Science Museum Group Research Conference exploring the theme of 'Sound and Vision in Science Museums' (see *Sound and Vision: The Second SMG Research Conference*).

The insight we can gain from operating historic collections is one area where we are particularly interested to work – after all, most of our collections were designed to be used rather than looked at. Associate Curator Annie Jamieson took part in an interdisciplinary workshop at the University of Leiden exploring 'Re-enactment, Replication, Reconstruction'. The participants, from the fields of archaeology, musicology, anthropology, history of science, conservation and museology, used historic technologies to make things, and took part in re-enactments of important experiments from the history of science as well as discussing ways that these techniques can be used to engage the public in museum contexts.

On a more routine note, our Library and Archives team have been working quietly behind the scenes to improve the information about our collections that we provide to researchers. Over the last year they have created and published online collections-level descriptions for all of our archive collections, so researchers can now quickly find out about what we have and how they can access it. As a result, we have created a series of 'taster' displays in our museum foyer showcasing highlights of the archive collections. We hope this will prompt more and more people to want to find out more, and explore the wealth of research potential in the museum.

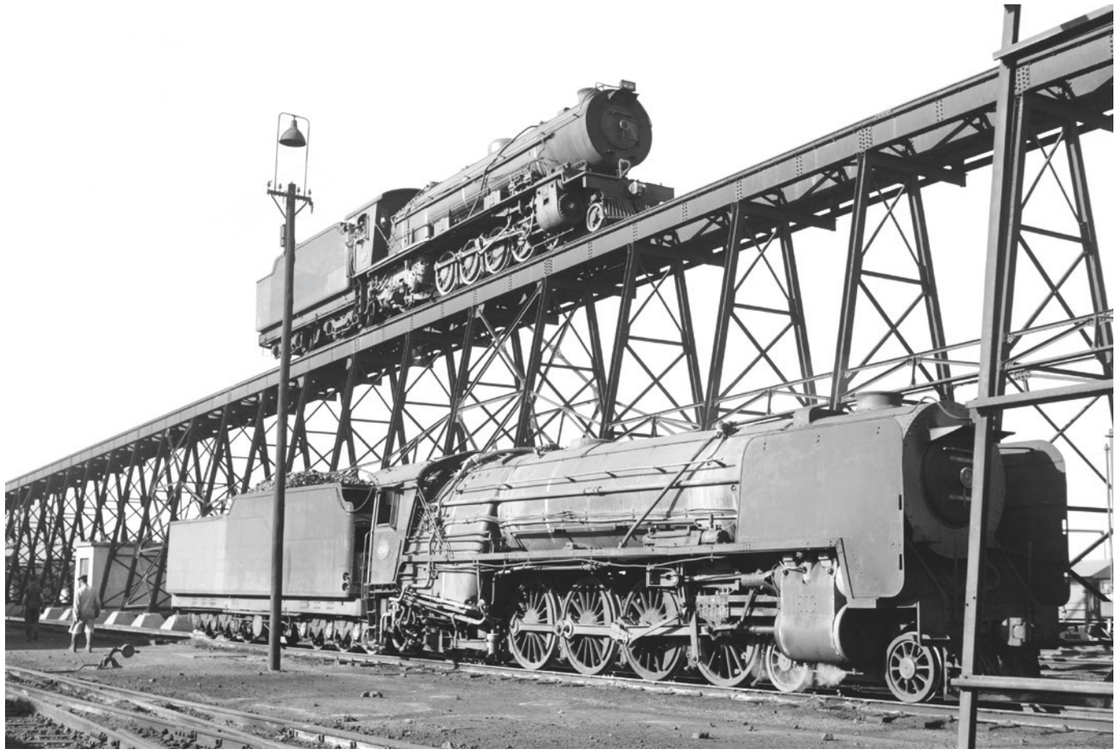
Top right: F Percy Smith, May 1936. Smith was a pioneering science and natural history film-maker, and this photograph is a highlight from the Charles Urban archive, recently catalogued by our Library and Archives team.

Right: 'Re-enactment, Replication, Reconstruction': Annie Jamieson with Lawrence Principe and John Hopkins in a sand-casting workshop at the Ateliergebouw, Rijksmuseum, Amsterdam. Image courtesy of Roeland Paardekooper.

RESEARCH AND PUBLIC HISTORY AT THE NATIONAL RAILWAY MUSEUM, 2016–2017

ED BARTHOLOMEW
Senior Curator, National Railway Museum

OLI BETTS
Research Lead, National Railway Museum



As the National Railway Museum's Masterplan development picks up pace, with the funding bid submitted to the Heritage Lottery Fund in November 2017, much of the research effort of the museum has been focused on new and intriguing horizons. From the garden cities of early-20th-century commuter dreams to the nitrate railways of the high Andes in Chile and Bolivia, we have been exploring the potential of our collections and archives to tell exciting and challenging stories that will reshape the public's image of the railways at home and abroad.

Most directly related to the Masterplan has been the hiring of two new members of staff with direct public history and research responsibilities. The return to the museum of Lorna Hogger, as Masterplan Curator, and the hiring of the (soon to be) Dr Thomas Spain as Research Associate has dramatically increased both the capacity and quality of our research. Spain's new position is particularly encouraging from a research and public history perspective as he was originally a collaborative doctoral student with the Science Museum Group – an experience that has allowed him to adapt seamlessly to his new role on the Masterplan.

Our collaborative doctoral programme continues to offer new insights into our collections. Hannah Reeves passed her viva successfully in late 2017, her project 'Women and the "Railway Family" 1900–1948' adding a new social history dimension to archival material such as staff magazines in the Search Engine collection. Our other students – Sophie Vohra ('Railways and Commemoration'), Elizabeth Adams ('Literary Cultures, Social Networks and the Victorian Railway Worker') and Amanda Stevens ('Home on the Rails') – all continue to make great strides with their research projects.

The retirement of Professor Mark Ormrod from the advisory board of the Institute of Railway Studies through ill health has been a sad loss to the ongoing collaboration between the University of York and the museum. This collaboration is due to relaunch, with a programme of conferences and workshops, in 2018. Other collaborations have continued with the University of York – Ed Bartholomew, Oli Betts, Alison Kay and Karen Baker have all spoken at university–museum events and hosted student and staff study groups in the museum.

We continue to build on our working relationship with the University of Sheffield as well. Dr Anna Geurts has been working with the museum in a research capacity but has also proved vital in helping to grow our existing partnership into a £45,000 placement running from January to March 2018. This has been secured through the enthusiastic support of Dr Amanda Crawley Jackson, Director of Impact and Engagement for the Faculty of Arts and Humanities, and the able assistance of Amy Ryall and Chris Leffler from the university. The Railway Cultures project provides an umbrella for research meetings, funding bid planning and public outreach through a variety of activities, and is very much a stepping stone to wider collaborations in the future.

The success of the *Mystery on the Rails* exhibition on crime fiction and the railways, a new direction for the museum, led to the *Journal of Victorian Culture* dedicating a special issue to the Victorian railway through the close collaboration of Karen Baker and Dr Trev Broughton from the University of York. A collection of critical articles, released from behind a paywall to the general public for the first time, was accompanied by an introduction written by Baker. Covering everything from the semi-mythical 'railway spine' to popular fiction and sensational tabloid journalism, this online collection showed just how varied the world of railways can be.

Above: Dining room at Stratford railwaymen's dormitory, 1911.

Below: Great Eastern Railway Special Constable badge 1914.

Left: South African locomotive depot at De Aar in 1968.

MUSEUM OF SCIENCE AND INDUSTRY RESEARCH HIGHLIGHTS, 2016–2017

GEORGINA YOUNG

Head Curator, Museum of Science and Industry

The tenth anniversary edition of the Manchester Science Festival was a high point of the academic year 2016/17 at the Museum of Science and Industry. Part laboratory, part playground, the festival has public engagement with research at its heart. The exceptional programme produced by lead academic partner University of Salford included Ryoichi Kurokawa's *Unfold* – an audiovisual representation of how the Solar System was born – and *Cloud Crash*, a series of installations by artists HeHe which drew on research funded by the Natural Environment Research Council to bring atmospheric science to life across the museum site.

The Science Museum Group's own research outputs also found a home in the festival's 2016 programme, for example through a presentation of Jean-Philippe Calvin's new score for the 1927 silent film *Museums of the New Age*. Moreover, the festival programme acted as a catalyst for collections engagement alongside research as the museum showcased textile dyes at the After School Science Club and curated a Platform for Investigation event around John Dalton and colour vision.

The Manchester Science Festival was a fitting conclusion to Manchester's year as European City of Science in 2016. This honour was linked to the city hosting the EuroScience Open Forum, the largest interdisciplinary science meeting in Europe, which itself included high-profile contributions from the museum team on topics ranging from 'Can citizen science deliver to society?' to 'The ghost of science past'.

Research interest in the Museum of Science and Industry's creative industries collections accelerated in the spring of 2017 as archive material related to the legendary Hacienda nightclub and Factory Records popped up in the museum's shop and featured in the Sound and Music Lates, giving mass exposure to stored collections. This enhanced profile led to a dramatic increase in research appointments to consult the collection and an expansion of the museum's music-interested research network, building on the Science Museum Group's strong existing research profile and networks around this subject.

The museum's collaborative doctoral award researchers had a winning year with Erin Beeston securing the annual University of Manchester University History Award for her essay 'A science museum "to rival South Kensington": curating the "university city" and establishing the North Western Museum of Science and Industry' and Josh Butt jointly awarded the inaugural *Science Museum Group Journal* Writing Prize for his article 'Adapting to the emergence of the automobile: a case study of Manchester coachbuilder Joseph Cockshoot and Co. 1896–1939'.

Fellow PhD researcher Paul Coleman asked which questions objects can answer that archive sources cannot when he led an object study workshop at the University of Leeds in June 2017, bringing together Science Museum Group PhD researchers, PhD researchers from the School of Philosophy, Religion and History of Science at Leeds and curatorial staff from both the Museum of Science and Industry and the National Science and Media Museum to examine ways to approach using objects in PhD research.

Meanwhile, the exhibition *Electricity: The Spark of Life* opened at the Wellcome Collection in London in February 2017, the result of a three-way partnership between the Wellcome Collection, Teylers Museum and the Museum of Science and Industry. The exhibition has been a lightning rod for research at the Museum of Science and Industry and across the partnership, and bears the influence of Paul Coleman's doctoral research into our electricity collections and the development of the national grid. It is expected that the museum's research will gain even greater prominence when the exhibition is reimagined for Manchester and headlines the 2018 Manchester Science Festival.

Electrotherapeutic chair, by C.B. Harness, English, 1890–1900 featured in the exhibition *Electricity: The Spark of Life*.

WHAT SCIENCE CAPITAL MEANS:
LEARNING RESEARCH ACROSS SMG

KAREN DAVIES
Head of Learning Research and Resources

JANE RAYNER
Audience Research and Advocacy Manager

The Science Museum Group's learning vision is to enrich the lives of a large and diverse audience by igniting their curiosity in science, technology, engineering and maths (STEM). We put audiences at the heart of everything we do, informed by audience research and academic research, and our aspiration is to provide people with a learning experience they would not get anywhere else. By applying the latest research to our practice, we deepen the impact of learning across the Group as well as provide sector-leading good practice.

Learning research areas of interest include under-8s; hard-to-reach audiences; the importance of dialogue at an exhibit/display and how to design for science talk; direct engagement with scientists; maker/tinkering spaces, play and gaming activities; and teachers' use of digital technology and how it can best support visits.

During 2017 the Audience Research and Advocacy team worked with academic researchers from University College London (UCL) to draw together and review institutional research about how visitors engage with objects, setting it in the context of current academic research on museum objects, meanings and engagement. The result of this collaboration was a literature review which has highlighted some interesting areas for future research. This includes furthering our understanding of visitor perception of authenticity and the range of learning experiences that can be mediated by interacting with original objects. Aspects of the literature review will be presented and discussed at a collaborative seminar organised by the Science Museum Group and UCL in June 2018. Invitations to this event will be forthcoming.

Other academic learning research projects that are informing the Group's work are detailed below.

Since 2012 we have been working with King's College London (KCL) and UCL on the Enterprising Science project to define and quantify science capital, as part of the Science Museum Group's drive to create a more scientifically literate and engaged society.

(An individual's science capital covers their knowledge, relevant qualifications, interests, attitudes, contacts, exposure to experiences, educational resources and 'the stuff they do in their free time'. It also incorporates identity – whether individuals see themselves as 'sciencey' and how their interactions with other people shape this.)

The science capital concept is pivotal to understanding how to support people from the widest range of backgrounds to engage with science, technology, engineering and maths, and is being used to shape our learning programmes, live events, online resources and future exhibitions. Our ambition is to provide experiences that enable more people to make deeper connections with science by accessing the capital they already have. In this way we can change attitudes and encourage more people to engage with science.

As the dimensions of science capital have become more defined, we have been identifying where and how the research can support our practice and help us plan for wider participation. In 2017 the UCL/KCL research team also undertook some pilot work on an adult science capital measure. Initial survey results suggested that adults had slightly higher levels of science capital compared with young people, which may highlight the value and significance of science experiences beyond school in growing science capital. We will be watching this work with interest.

Illustrations by Michael Parkin.

In the Science Museum Group's 'Inspiring Futures: Strategic Priorities 2017–2030' document, our number-one priority is to 'grow science capital in individuals and societies'. To support staff in understanding what this means for their work, we are rolling out a reflective practice training package to help everyone understand what science capital is, and to help staff apply the concept. Whether behind the scenes or in a public-facing role, everyone within the Group has a part to play in creating welcoming, relevant and inspiring experiences for our audiences, and we hope that through science capital we can create a shared understanding of how staff can all work together to achieve just that.

The Building Bridges project which started in 2012 ended in summer 2017. It provided young people with links ('bridges') between the science learnt at school, the science encountered at the Science Museum, and science as part of everyday family activities that take place across settings including the home, parks, libraries and community centres. Initial research on the project conducted between 2012 and 2015 by Sheffield Hallam University focused on the impact of the project on how students view, respond to and engage with science in school. This research provided evidence that multi-nodal interventions can have a longer impact on student attitudes to science than simpler single-node ones such as a one-off visit to a science festival. An important finding of this research was also that the students' families and family life play an important role in establishing this impact.

This led to a collaboration in 2015 between the Science Museum and UCL to undertake research on families who are part of the Building Bridges project and who are members of underrepresented visitor groups in the Science Museum (such as families from ethnic minority backgrounds and families with low socioeconomic status). The research considers the resources, interests and aspirations these families have that may not be explicitly related to science, but which may nonetheless provide important insights into how to address issues surrounding underrepresentation of specific groups in museums.

This work also aimed to examine the specific objectives of the Building Bridges project and provide recommendations for the ongoing project and future projects at the Science Museum and elsewhere. The research questions are:

- How might families' cultural references and values, including their interests and aspirations, affect their engagement with Western science?
- How do families' everyday conversations, activities and skills relate to science content, process and/or practice?
- What is the impact of families' involvement in the Building Bridges project on their views, conversations and activities related to science?
- Emerging findings in August 2016, among others, indicated that:
- Families are generally very positive and enthusiastic about the Science Museum. However, some families associate the museum primarily with school visits, and do not necessarily see it as a setting for their families to visit. This seems to be because they do not think of themselves as having the perceived necessary attributes, including understanding, skills and inclination to visit.
- Families' cultural references and values are dynamically shaped through everyday interactions across different contexts. This includes families being guided by local networks surrounding them. For example they establish norms based on, and seek support from, local community and religious groups. This is the case particularly if parents speak a limited amount of English.
- Reaching out to families through secondary schools might be insufficient, as neither the schools nor the families are used to engaging with each other beyond a fairly narrow set of curriculum-related issues. There are other more prominent networks that are part of families' everyday lives, including the community and religious groups. There is some indication that local networks can support family engagement with educational activities, including science engagement (see the Building Bridges interim research findings report of August 2016 for more details).

New research projects under way include the Move2Learn project (begun in September 2017), which is exploring 3- to 6-year-old children's actions/gestures in relation to their science learning. It involves academics and museum/science centre practitioners from both the UK and the USA. COMnPLAY, a European Horizon 2020 project that began in June 2017, looks at the nature of the informal science learning gained through coding, making (maker spaces) and play (gaming) activities. The project uses a science capital conceptual framework, and the topic areas have many interesting crossovers for the Group.

If you wish to learn more about any of these projects, please contact Karen Davies: karen.davies@sciencemuseum.ac.uk

Ayesha Nathoo

WELLCOME TRUST SECONDMENT FELLOWSHIP SCHEME

TIM BOON

Head of Research and Public History

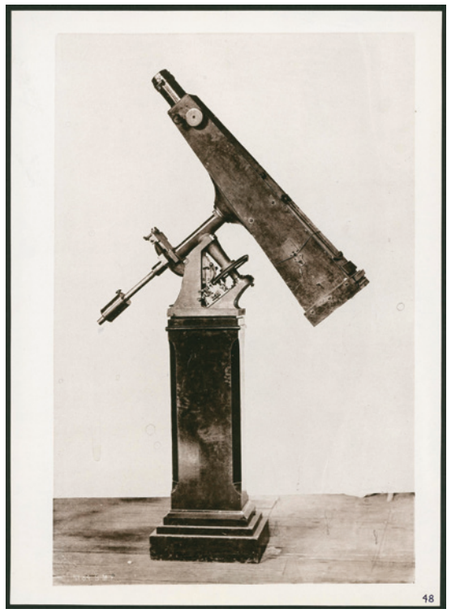
In 2016/17 we were able to welcome to the Science Museum two early-career scholars under the newly expanded Wellcome Trust Secondment Fellowship Scheme. The Wellcome Trust had decided to develop an existing programme in which researchers funded under its doctoral or postdoctoral funding provision could be seconded to the Parliamentary Office of Science and Technology, where they would undertake a piece of science policy work. The scheme combines the demand for early-career scholars to gain vocational insights with institutions' constant requirement for work to be undertaken on priority projects. The mechanism is simple: the Wellcome Trust agrees to continue paying the successful candidates' salary for the period of the secondment at the museum (in this case, six months). Because the secondees are working on projects that matter to the host institution, they are satisfying to work on, even as they enable the learning of new skills.

When the Wellcome Trust expressed an interest in expanding the scope of the secondment fellowships, we at the Science Museum Group were most enthusiastic about the potential for suitably qualified people to come and work with us. Host institutions also include the World Health Organization Regional Office for Europe and the Organisation for Economic Co-operation and Development. The recruitment process for fellows to come to the Science Museum included the advertising of a range of the museum's upcoming projects, with an invitation to applicants to discuss their related ideas with staff at the museum.

The interview process led on this occasion to the selection of two postdoctoral researchers to work developing content for planned temporary exhibitions.

Dr Jo Hedesan, at that stage working on the history of alchemy as a Wellcome Trust Research Fellow in Medical History and Humanities at the University of Oxford, brought valuable expertise in early modern history to bear on an upcoming temporary exhibition on humankind's relationship with the Sun. Dr Ayesha Nathoo, a Wellcome Trust Research Fellow at the University of Exeter working on the history of relaxation therapies, brought research expertise in 20th-century medical history to bear on a proposed exhibition on the cultural history of immortality. Both researchers have seen from the inside the processes by which museums achieve that most sought-after achievement: cultural impact for research. They can feel grateful to the Wellcome Trust for the opportunity to do so.

There is an annual competition for applications, which is advertised early in the year, with fellowships usually commencing in the autumn.



The Kew photoheliograph, 1857: the first astronomical instrument specifically designed for photographing celestial objects. Featured in the forthcoming *Sun* exhibition.

RESEARCH PROJECTS AT THE SCIENCE MUSEUM ARCHIVES

BEATA BRADFORD

Archive Collections Manager

The opening of the Science Museum's Dana Research Centre and Library in March 2016 has had a transformative effect on access to our library and archive holdings. Special collections, books and archives previously only available within the Wroughton Reading Room can now be requested for consultation in London, a development enthusiastically welcomed by many of our users. Utilising facilities across the two sites also enabled us to pilot a series of research projects wherein the archive team and researchers collaborated on project design, thereby ensuring maximum availability of research output for our audiences through integration into archive catalogues, online publication and promotion on professional platforms. Within this new environment, research projects have flourished across areas as diverse as medicine, aeronautics, music, philosophy and the Science Museum's own history.

Dave Saunders, hosted as part of the Wellcome Secondment Fellowship Scheme, is researching one of our prominent medical collections, the Burden Neurological Institute Archive. The institute specialises in human neurological disorders and clinical and experimental neuroscience, and its origins can be traced back to the first national institution for mental and psychiatric disorders set up by Reverend Burden in 1902. The Science Museum holds both archives and objects representing the work of the institute, and Saunders is exploring the relationships between these collections which have traditionally been viewed as separate. He is constructing a unified narrative for publication in the *Science Museum Group Journal* and on the Science Museum website, and for promotion at specialist conferences and seminars. As a part of the project, Saunders is also creating a catalogue of the archive, which will be available via Collections Online.

One of the most popular research collections during the past year has been the archive of John William Dunne, an early aviation pioneer and writer on parapsychology. Two researchers working with this collection focused on different aspects of Dunne's fascinating career and achievements. Kitt Price, a senior lecturer from Queen Mary University of London, conducted in-depth research into the aspects of the archive that related to Dunne's work on parapsychology for her upcoming publication on early dream precognition theories. During the research, Price was encouraged to create a comprehensive listing of the collection, highlighting important events, personalities and breakthroughs relating to Dunne's work and life. With the help of Price's input, we now have more than 6000 individual entries for this part of the archive. Guy Inchbald is working on a biography of Dunne, predominantly Dunne's achievements in aerodynamics, and his research and insights have been of immense value in increasing understanding of a collection for which little external evidence survives.

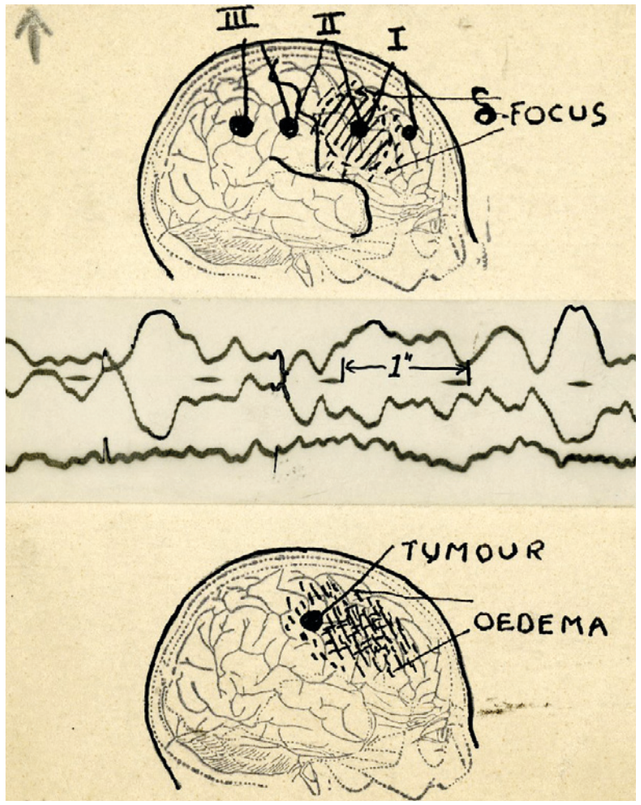
The history of the Science Museum has been explored in depth by our own Cate Watson for her dissertation '"Is it a Zoo for Aeroplanes?": Investigating the Subjects on Permanent Display at the Science Museum from 1909 to 2000'. Concentrating on factors and influences on gallery design and how they reflected changing priorities of the Museum, Watson gained a comprehensive understanding of the collection which she now applies widely in her work as a member of the archive team, as well as in supporting researchers to delve into the past of our organisation. Following completion of her dissertation, Watson is currently focused on promoting the collection on internal and external platforms.

Another example of mutually beneficial collaboration has been Frances Morgan, who researched papers of the electroacoustic musician Hugh Davies as part of her investigation into the history of Electronic Music Studios, a London-based studio and electronic instrument company operational between 1968 and 1979. Utilising her expertise in the subject, Morgan helped us to rationalise and interpret the collection, and has produced a comprehensive listing of its individual components. The resulting catalogue has been published on Collections Online.

Drawing on the success of these projects, we aim to broaden our collaboration with external and internal researchers to help us better understand, share and celebrate our world-class collections. Through this collaborative approach, we will continue to expand and make available new knowledge and insights, form connections that facilitate the promulgation of our collections via exhibitions, loans and publications, and grow the science capital in individuals and society. Looking ahead, we are set to embrace and develop the new opportunities that will arise from both the One Collection project and the forthcoming establishment of Science Museum Group facilities at the National Collections Centre at Wroughton.

Left: Wright Brothers' Second Signal Corps aircraft.

Below: From the Burden Neurological Institute archives.



SCIENCE MUSEUM GROUP PUBLICATIONS AND PRESENTATIONS, ACADEMIC YEAR 2016–2017

ACADEMIC PUBLICATIONS

J Bennett, *Navigation: A Very Short Introduction* (Oxford: OUP, 2017); with M Hunter, *The Image of Restoration Science. The Frontispiece to Thomas Sprat's History of the Royal Society (1667)* (Abingdon: Routledge, 2017)

T Boon and Annie Jamieson, John Kannenberg, Aleks Kolkowski and James Mansell, 'Organising Sound', *Science Museum Group Journal*, Vol. 8, no. 08, 2017.

T Boon and Roger Kneebone, Peter Heering, Klaus Staubermann, and Yves Winkin, 'A Symposium on Histories', *Science Museum Group Journal*, Vol. 8, no. 08, 2017.

T Boon and James Mooney, Dorien Schampaert), 'Editorial: Alternative Histories of Electroacoustic Music', *Organised Sound*, 22 (2017), 143–49

T Boon '"Programmes of Real Cultural Significance"': BBC2, the Sciences and the Arts in the Mid-1960s, *Journal of British Cinema and Television*, 14, 2, pp.324-43

A Boyle and J-G Hagmann (eds), *Challenging Collections: Approaches to the Heritage of Recent Science and Technology, Artefacts: Studies in the History of Science and Technology* Vol. 11 (Washington, DC: Smithsonian Institution Scholarly Press, 2017)

J Bradford and L Souter, 'Community collaboration and mutual benefit: experiences from the Science Museum', *Informal Learning Review*, 140 (September 2016), pp13–16

R Bud, 'Science, Brands and the Museum', *Journal of Science Communication*, vol. 15, no. 6,2016

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R Bud, 'Adventures in Museology: Category Building over a Century, and the Context for Experiments in Reinvigorating the Science Museum at the Turn of the Twenty-First Century'. *Science Museum Group Journal*, vol. 8, no. 08, 2017

L Burden and D Kelles-Krause, 'The Science Museum "bubble crate" system', *ICON News*, 67 (November 2016), pp32–34

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J Desborough, review of the Science and Technology galleries at National Museums Scotland, *Science Museum Group Journal*, 7 (April 2017), DOI 10.15180/170712

R Highfield, with P V Coveney and E R Dougherty, 'Big data need big theory too', *Philosophical Transactions of the Royal Society A*, 374/2080 (October 2016), DOI 10.1098/rsta.2016.0153

B Regel, J Langfeldt, L Burden and M Ryan, 'Doping at the Science Museum: the conservation challenge of doped fabric aircraft in the *Flight* gallery', *Science Museum Group Journal*, 6 (October 2016), DOI 10.15180/160605

B Russell (ed.), *Robots: The 500-Year Quest to Make Machines Human* (London: Scala, 2017)

Vickers Vimy aircraft in the Science Museum's Flight gallery.

ACADEMIC PRESENTATIONS

G Almond, 'Functional fashion: harmonising approaches to nineteenth century spectacles', Postgraduate Conference, Swansea University, October 2016; 'Spectacles and short-sightedness: a disability history', Institute of Historical Research, December 2016

K Baker, 'Railways and the culture of crime', Making the Connections: Transport and its Place in History conference, University of York, November 2016

J Bennett, '"Mecanicall Practises Drawne from the Artes Mathematick": mathematical repute and the navigator John Davis', Beyond the Academy: The Practice of Mathematics from the Renaissance to the Nineteenth Century conference, British Society for the History of Mathematics, York, April 2017; 'Robert Hooke and the management of images: seeing, drawing and printing in the service of the mechanical philosophy', Art and Science: A Binary Relationship? conference, University of Pisa, May 2017; '"That incomparable instrument maker": the reputation of Henry Sutton', History of Practical Mathematics conference, Universitat Pompeu Fabra, Barcelona, March 2017

O Betts, 'Enginorum: the culture of a Great Western Railway office', Institute of Railway Studies, University of York, November 2016; 'Maintaining the connections: a social and cultural history of the permanent way', Making the Connections: Transport and its Place in History conference, University of York, November 2016

C Binks and H de Saram, 'Conservation on the Dynamometer', Annual Carriage Restorers' Convention, North Norfolk Railway, October 2016

T Blyth, 'Six networks that changed the world', Heinz Nixdorf Colloquium, Heinz Nixdorf Museums Forum, Paderborn, October 2016

T Boon, 'The synaesthetic museum', Understanding Use, Artefacts XXI conference, Science Museum, London, October 2016

T Boon and B Sherman, 'The Department of Science and Art revisited: the view from South Kensington', research seminar, Science Museum, London, October 2016

A Boyle, 'Collecting and interpreting contemporary science, technology and medicine at the Science Museum, London', Les musées scientifiques et techniques et le patrimoine contemporain conference, Musée des Arts et Métiers, Paris, October 2016; 'Communicating while concealing: exhibiting Britain's atomic piles, 1949–1960', Fun and Fear: The Banalization of Nuclear Technologies through Public Displays and Activities conference, Universitat Pompeu Fabra, Barcelona, June 2017

A Boyle and R Higgitt, 'London 1600–1800: communities of natural knowledge and artificial practice', panel discussion, London 1600–1800: Communities of Natural Knowledge and Artificial Practice conference, Science Museum, London, June 2017

E Bruton, 'From a spark to a flame: Arthur Heaviside's experiments with wireless communications in the 1880s', British Society for the History of Science Annual Meeting, University of York, July 2017; '"Uncertain at present for women but may increase": opportunities for women in wireless telegraphy during World War One and the interwar era', The British Post Office in the Telecommunications Era conference, Science Museum, London, August 2017

R Bud, 'Applied science', keynote address, 2nd International Conference on the History of Physics, European Physical Society, Pöllau, September 2016; prerecorded contribution to 'Collections and museums in the history of science and technology', 9th Greek Conference of History and Philosophy of Science in Science Teaching, Athens, November 2016; contribution to commemorative round table on the foundation of the Society for the Social Studies of Science, Where Has STS Traveled conference, Cornell University, Ithaca, NY, October 2016; 'An historiography of science starting with the public sphere: the case of "applied science"', Modern Sciences Working Group seminar, Harvard University, Cambridge, MA, November 2016; 'How history of concepts can bring together history of science and STS: the case of applied science', Fellows STS Program seminar, Harvard University, Cambridge, MA, November 2016; 'Penicillin: triumph and tragedy', public lecture, Museum of the History of Science, University of Oxford, November 2016; 'Selling visions: Kantianism and cameralism realised through encyclopediae in Germany and beyond', History of Science Society Annual Meeting, Atlanta, GA, November 2016

L Burden, B Cairncross and E Duggan, 'Cutting down on contractors: trialling the use of museum staff from all departments to pack deinstalled medical objects', 18th European Association of Museums of the History of Medical Sciences Congress, Groningen, September 2016

L Burden, J Langfeldt, B Regel and M Ryan, 'Informing conservation management decision making at the Science Museum: investigating the properties of doped fabric aircraft', Science Museum Group Research Day, Science Museum, London, March 2017

S Butler, '"Chernobyl couldn't happen here": exceptional reactors and exceptional public opinion', Material Cultures of Energy workshop, Science Museum, London, September 2016

O Carpenter, 'Concrete hopes and fears', Being Human Festival of the Humanities, Science Museum, London, November 2016

A Cliff, 'A 3D chart of energy consumption, 1951–54: methodological challenges', DEMAND Centre seminar, Lancaster University, November 2016; 'Three museum objects: three methodological challenges', Material Practices of Energy Consumption: Use and Abuse of Energy in the Past conference, Science Museum, London, September 2016

R Cole, '"Chemist has the answer" (*The Guardian*): George Porter, a cheerleader for chemistry in post-war Britain', New and Old Themes in the History of Chemistry meeting, Royal Institution, London, May 2017; 'Static displays: exhibiting the Royal Institution's Nairne machines, 1802–present', The Evolution of the Museum, V&A Universal Histories and Universal Museums conference, Blythe House, London, July 2017

C Connelly, 'Untangling Ohm's apparatus', Object Lessons and Nature Tables: Research Collaborations Between Historians of Science and University Museums conference, University of Reading, September 2016

A Coulls, 'The Fletcher Jennings locomotive works at Lowca', Institute of Railway Studies, University of York, November 2016

A Coulls and H de Saram, 'Conserving a restoration', Paint on the Move Traditional Paint Forum conference, Black Country Living Museum, Dudley, September 2016

J Desborough, 'The making of the modern clock & watch dial 1550–1770', Antiquarian Horological Society meeting, Threadneedle Investments, London, November 2016; 'Scientific instrument makers 1600–1800', Metropolitan Science conference, Science Museum, London, June 2017

S Emmens and K Gonzalez-Bell, 'Working with the wounded: the co-curation of military mental health', 18th European Association of Museums of the History of Medical Sciences Congress, Groningen, September 2016; Understanding Use, Artefacts XXI conference, Science Museum, London, October 2016

J Hicks, 'Introduction to the archive collections at the Museum of Science and Industry', workshop and study session for Manchester Metropolitan University School of Art interactive arts students, Museum of Science and Industry, Manchester, September 2016; presentation to University of Manchester Centre for the History of Science, Technology and Medicine master's students, Museum of Science and Industry, Manchester, November 2016

R Highfield, 'Bioethics and its role in public policy', Bioethics and its Role in Public Policy conference, Institute of Contemporary Arts, London, November 2016

N Logan, 'Producing tours of their Blythe Road stores as part of LB Hammersmith and Fulham's Artsfest festival and how they deal with research requests', Tour de Store: Improving Public Access to Collections in Storage conference, Museum of London, July 2017

A McLean, 'The most successful train in the world?', High Speed Rail Technologies seminar, Institution of Mechanical Engineers, London, September 2016

D Millard, 'Spacecraft as samovars: the making of the *Cosmonauts* exhibition', science and technology studies departmental seminar, University College London, October 2016

S Mossman, 'Early plastics: parkesine, celluloid and legacy', Plastics Heritage Forum Kunststoffgeschichte 2016, Hochschule für Technik und Wirtschaft, Berlin, October 2016; 'Early plastics: perspectives 1850–1950', 39th History of Technology Conference, Iron Library, Schlatt, November 2016; 'Objects made of cellulose acetate at the Science Museum: collection, conservation, exhibition', Transparent Figures – Exhibition Icons of the 20th Century interdisciplinary graduate programme for long-term conservation of plastic objects, Deutsche Hygiene-Museum, Dresden, June 2017

H Reeves, 'Who were the Railway Women's Guild? A case study of Gloucester, 1900–1948', Women's History Network Conference, Leeds Trinity University, September 2016

P Roberts, 'Building media history from fragments: ephemeral technologies and material economies', Excavating Media: Devices, Processes, Apparatuses conference, University of Cambridge, July 2017

H Robertson, 'Gunpowder experiments in the early Royal Society c. 1660–1700', research seminar, Science Museum, November 2016

D Rooney, 'Quartz clocks and the public in Britain, 1930–60', research seminar, Science Museum, November 2016

D Rooney and T Parkin, 'Mathematics and the public: Science Museum approaches to hands-on and history', MATRIX Conference, University of Leeds, September 2016

B Russell, 'A curatorial research approach', Postgraduate Festival, Rutherford College, University of Kent, May 2017; 'Making exhibitions: a curatorial approach', CDP research workshop, British Museum, London, February 2017; 'Making machines in the city', Metropolitan Science: Places, Objects and Cultures of Practice and Knowledge in London, 1600–1800 workshop, Science Museum, June 2017; 'Robots: managing public expectations in an exhibition setting', AI: Myth and Reality conference, Leverhulme Centre for the Future of Intelligence, University of Cambridge, May 2017

H de Saram and S Houldridge, 'STEM' Chemistry in Art 6th Form Workshop Conference, University of York, September 2016

R Smith, '20th July 1933. Following Malindine's assignment photographing a protest march through the *Daily Herald* picture library', seminar for De Montfort University photographic history MA students, National Media Museum, Bradford, February 2016; '"Our picture shows... Scenes in the *Daily Herald* news room": how the *Daily Herald* perceived itself at work', Displaying Knowledge through Photography, 10th International Conference of the Doctoral Programme Dispositives of Vision: Cinema, Photography and Other Media, University of Lausanne, November 2016; 'Questions of evidence in a press photography archive', Doing Visual History: Using Visual Sources in History Teaching and Research workshop for academic staff and postgraduate students in the East Midlands, Loughborough University, September 2016

K Tracey, 'Marking mathematical readers in early modern England: an analysis of John Seller's *A Pocket Book and Its Annotations*', British Society for the History of Mathematics Research in Progress meeting, University of Oxford, February 2017; research seminar, Science Museum, June 2017; 'Revisiting the "Stationers' Commonwealth": printing knowledge in the seventeenth-century metropolis', Metropolitan Science, 1500–1700: Open Workshop, Science Museum, June 2017

J Ward, 'The politics of automating the telephone network in post-WWII Britain', Annihilating Space & Time: 150 Years of Transatlantic Telecommunication conference, Royal Institution, London, September 2016

Information Age gallery at the Science Museum, the subject of a presentation by Tilly Blyth this year.

PhD student Erin Beeston conducting a site tour at The Museum of Science and Industry.

OUR STUDENTS

NEW COLLABORATIVE DOCTORAL STUDENTS, 2017

AMANDA STEVENS

Project title: Home on the Rails: The design fitting and decoration of train interiors in Britain c 1920-1955

Supervisors: Dr Clare Taylor (Open University) and Anthony Coulls (National Railway Museum)

Traditionally railway carriages have been singled out for their special or unique features. This project centres on the lives of a select number of carriages which served a variety of routes, purposes and people. It interrogates the materiality of the interiors, uncovering design choices and designers and considers the kitchen car as a paradigm for the modern domestic kitchen.

CAMERON TAILFORD

Project title: Making electronics in interwar Britain: gendered labour in the thermionic valve industry

Supervisors: Graeme Gooday, Annie Jamiseon, Alison Fell

Precis: This research project will investigate the new electronics industries that emerged in Britain during the inter war years and focus on their predominantly female workforce. In particular this project will look at the thermionic valves that were mass produced by women during the period and were used in a variety of consumer electronics including phones and radios, many of which are now held at the Manchester Museum of Science and Industry.'

FRANCESCA ELLIOTT

PhD Title: Power-assisted learning? Exhibiting, interpreting and teaching on technology in the twentieth-century industrial city

Supervisors: Dr James Sumner, The University of Manchester; Jan Hicks, Museum of Science and Industry

Description: Working with the collection and archives of the MSI, this project is looking at the use of model engines in teaching in the twentieth century industrial city. At the height of Manchester's industrial prowess, models were used in education both professional and public. Many of these models became part of the MSI's collection and are now used as demonstration pieces.

GEORGINA JAYNE LOCKTON

Research project title: Science, Technology and Road Safety in the Motor Age

Supervisors: Professor Simon Gunn and Dr Sally Horrocks (University of Leicester). Dr Oliver Carpenter and Dr David Rooney (Science Museum)

This PhD topic is concerned with the history and development of road safety research in Britain, focusing specifically on the technological innovations of the 1960s and 1970s. A variety of road safety items from this period, which are held in the collections of the Science Museum, form the main primary sources on which this object centred thesis will be based.

REBECCA KEARNEY

Project title: "False Teeth for the Masses": Artificial Teeth as Technologies, Prostheses and Commodities in Britain, 1848–1948

Supervisors: Dr Claire L. Jones (First Supervisor, University of Kent). Dr Oisin Wall (First Supervisor, Science Museum Group). Dr Julie Anderson (Second Supervisor, University of Kent). Dr Jack Davies (Second Supervisor, Science Museum Group)

This project will examine the transformation in the consumption and use of artificial teeth in Britain between 1848 and 1948. Drawing on the Science Museum collections, it will assess how artificial teeth took on multiple meanings in everyday life. The research has important implications for expanding historical scholarship on health, prostheses, dental technology, consumer culture and the afterlife of objects within the museum

SARAH MURPHY-YOUNG

Project title: Constructing and Consuming Imagined Futures: Advertising Healthcare to Publics and Professionals in Twentieth-century Britain

Supervisors: James Stark. Adrian Wilson. Oisín Wall

The project will investigate, compare and explain the use of language, expertise and authority in printed advertisements and publicity produced for public audiences and medical professionals regarding different healthcare products and campaigns in twentieth-century Britain. Three case studies will provide a national picture of the interactions between healthcare producers and consumers before and after the NHS was founded.

OUR STUDENTS

COLLABORATIVE DOCTORAL AWARD AND PARTNERSHIP STUDENTS, PRE-2017 START

PRE-2013 CDA

CAT RUSHMORE*

Chemicals in the Home

Oxford Brookes and Science Museum

TOM RICHARDS*

Oramics: Precedents, Technology and Influence

Goldsmiths and Science Museum

CDP 2013+

ALICE HAIGH

Dollis Hill Project A: 'Research is the door of tomorrow' c. 1910–1983 (PhD 1 of 3)

History & Philosophy of Science, Leeds and Science Museum

CAITLIN DOHERTY

Representations of Flight: The Eighteenth Century Imagination and Modern Collections

History & Philosophy of Science, Cambridge and Science Museum

EMILY MARSDEN

2016: Media in the First World War

History and Centre for Advanced Photography Studies, Durham and Media Museum

ERIN BEESTON

Spaces of industrial heritage: a history of uses, perceptions and remaking of the Liverpool Road Station site, Manchester

CHSTM, Manchester and MOSI

LAURA NEWMAN*

Making germs real: creating, performing and learning about a dangerous invisible thing in the public sphere, c.1860–1930

History, KCL and Science Museum

NOEME SANTANA*

Building an empire: corporate vision and the global geographies of infrastructure

Geography, RHUL and Science Museum

TANYA KENNY

Britain's Railways in the Great War, 1914–1918

History, Aberdeen and National Railway Museum

THOMAS SPAIN*

Food Miles: the Imaginings, Politics and Practices of Food Distribution in the UK, ca1920-1975

IRS, History, York and National Railway Museum

CDP 2014+

BENJAMIN REGEL

Conserving doped fabric aircraft: historic origins; heritage outcomes

Imperial College and Science Museum

CHARLOTTE CONNELLY

Investigating the flow of electrical ideas through the instruments of their discovery, from 1800–1850

Cambridge University and Science Museum

HANNAH REEVES*

Women and the 'railway family' (1900–48)

Keele University and National Railway Museum

JACOB WARD*

Dollis Hill Project C: Research Transplanted and Privatised: Post Office/British Telecom R&D in the Digital and Information Era

University College London, Science Museum and BT Archives

PAUL COLEMAN

Danger – High Voltage: the rise of megavolt electricity supply in 20th century Britain

University of Leeds and MOSI

PHILLIP ROBERTS*

Magic Lantern Culture in Britain (1850–1920): Exhibition, Reception and Mixed Media Landscapes

University of York and National Media Museum

RACHEL BOON

Dollis Hill Project B: The Research Life of the Established 'Station' in the 'long Cold War': Analogue and Digital Era

University of Manchester, Science Museum and BT Archives

OUR STUDENTS

COLLABORATIVE DOCTORAL STUDENTS, PRE-2017 START

CDP 2015+

DOM WELDON

Mapping the Historical Growth & Cultural Context of the British Fixed Line Network

King's College, Science Museum and BT Archives

FRANCES MORGAN

Electronic Music Studios in musical, commercial and international perspective

Royal College of Art and Science Museum

GEMMA ALMOND

Correcting vision in nineteenth-century England: A social, cultural, medical and material history of spectacles

Swansea University and Science Museum

JOSH BUTT

The rise and fall of the Manchester motor industry, 1896–1939

Manchester Metropolitan University, Museum of Science and Industry

KEVIN TRACEY

Calculating value: using and collecting the tools of early modern mathematics

Swansea University and Science Museum

REBECCA SMITH

The Daily Herald: Popular desires and managing the production of photographs

DeMontford University and National Media Museum

SOPHIE VOHRA

Railways and Commemoration: Anniversaries, Commemorative Cultures and the Making of Railway History

University of York and National Railway Museum

TOM RITCHIE

Meccano: The nuts and bolts of science University of Kent and Science Museum

CDP 2016+

ARON STERK

Emanuel Mendes da Costa (1717–1791): multicultural and multinational networks in Georgian London

University of Lincoln, Royal Society and Science Museum

CAROLINE AVERY

Making the pulse: the Reception of the Stethoscope in nineteenth century Britain, 1817-1870.

University of Leeds and Science Museum

ELIZABETH ADAMS

Literary Cultures, Social Networks and the Railway Worker, 1840–920.

University of Stirling and National Railway Museum

JOSHUA SCARLETT

Instruments and their makers: A study of experiment, collaboration and identity in seventeenth-century London

University of York, Science Museum and Royal Society

*Subsequently submitted/awarded

OPPORTUNITIES TO STUDY AND RESEARCH WITH US

TIM BOON

Head of Research and Public History

The Science Museum Group's research ethos is intrinsically collaborative: we want to work with colleagues in the universities and other heritage organisations who share our passionate interest in museum collections, the public culture of science – including museum audiences and museum possibilities more widely. This will be evident throughout the pages of this report.

Our doctoral programme is one example; each student has a supervisory team that brings together university-based researchers with museum-based professional staff. The conversations around the development of the students' projects enact the dialogue between museums and universities. Would you like to supervise a student or be a doctoral student at the Science Museum Group? Most of our students are supported by our collaborative doctoral partnership funded by the Arts and Humanities Research Council. Our consortium – which includes all the museums of the Science Museum Group alongside the Royal Society, Royal Geographical Society and BT Archives – currently awards six studentships per annum.

Early each summer we publish a document outlining the subject areas in which we are most interested, and arrange meetings where potential supervisory teams can discuss potential projects. We then invite colleagues in the museums and universities to work together to propose projects that address those areas for a first-round closing date in September, and the shortlisted projects must be submitted by late November. A panel selects the best projects in January, after which the universities advertise the studentships to start in the following October. It is worth mentioning that prospective students are often closely involved in writing these proposals, and that this approach provides an alternative route to self-determined study for those who have particular interests in material culture or museums. Increasingly, we also welcome students funded under other schemes, and indeed by other funders, to work in our Research Centre and on our collections.

The Dana Research Centre and Library is the venue for a rich variety of seminars, workshops and conferences. The majority of these are also the fruit of collaborations with universities, and notably of joint research projects, whether the Group is Co-Investigator or Project Partner. We like to be involved in projects that shed light on our collections and the contexts in which they arose and were used. One example this year was a very fruitful project partnership with the AHRC-funded 'Material Cultures of Energy' project led by Frank Trentmann and Hiroki Shin of Birkbeck, University of London (featured in the previous issue of this report). The project workshop in September 2016 was so fruitful that it has led to a special issue of our Journal to be published in spring 2018.

The Science Museum Group Journal is another example of how we like to work with colleagues in the universities, and with other museums too. We see this publication as a key home for discussion on the issues and subjects that unite everyone who loves science and technology museums, including those who work in them. We are proud of the journal's mixed authorship, which unites senior faculty and early career researchers, many of whom are publishing their first article.

The Research Centre is also host to a wide range of researchers and students, all contributing to the museum's programmes at the same time as they pursue research that will be submitted, published or performed under their own names. It is here that we undertake most of the teaching for our 'curating science and technology' ten-week option within UCL's science and technology studies MSc programme. This option provides students, who may come from science or humanities first degrees, with insights into the ways in which the 'history of science' – as broadly conceived – is done in museums. The option has a particular stress on objects, the material record of the practice of science, technology and medicine in the past – including the recent past. Students learn from a wide range of case studies taught by a dozen curators, looking into: the 95% of the museum's collections not on display, and the 5% that is; and exhibitions that have been completed and remain on display, as well as those in development. We consider key technologies from astrolabes to rockets and stretchers to phonographs; students learn how the museum goes about tackling the large-scale and unwieldy material culture associated with infrastructure or sound, for example. Some students stay on to write their dissertations with us; there is a near infinity of museum objects that can be the focus of a long essay informed by the readings and debate across the whole MSc.

For individuals with doctorates, at whatever career stage they have reached, we have fellowship and associateship schemes that are designed to support long-term relationships and targeted research projects. Our small number of associates are fellow travellers on particular research journeys. These individuals may be spending a research sabbatical with us, or may become fellows when funding becomes available. Our fellows are supported by a variety of agencies, including RCUK and European funding bodies, trusts and foundations.

For all our research collaborations, we stress that at any given time the museums in the Group have particular research priorities, most often related to upcoming galleries and exhibitions, although more distant research propositions that employ our collections are always of interest to us.

People at all the different stages of academic experience described here have the opportunity to interact in the Research Centre, where the reading room and some limited 'hot desk' provision enables people to join our research culture, just as they do when they attend our seminars, workshops and conferences.

If you would like to study or research with us, please take a look at our web pages, group.sciencemuseum.org.uk/our-work/research-public-history, or e-mail us at: research@sciencemuseum.ac.uk

Right: Oil Rigs Silhouetted Against a Texas Sunrise.

Far right: Metal ammoniaphone - a nineteenth century instrument designed to help singers and public speakers improve the quality of their voice.

OUR TEAM

TIM BOON

Head of Research & Public History

Tim is Head of Research & Public History and a historian of the public culture of science. He is responsible for developing the Museum's Research & Public History programme, which is concerned with investigating the lay historical imagination as it relates to science and technology. His exhibitions include Health Matters (1994) and Making the Modern World (2000). His first book, Films of Fact, was published in 2008, and he is co-editor (with Frode Weium) of Artefacts: Material Culture and Electronic Sound (2013).

ALISON HESS

Research & Public History Manager

Alison supports a variety of activity in the department, including applying for grant funding and supporting others to do so. She also manages the Collaborative Doctoral Partnership scheme and the Science Museum's relationships with Doctoral Training Partnerships. Alison works with other research organisations to develop expertise in grant applications within the heritage sector. As well as her work to support the department, Alison also runs her own research projects.

BERGIT ARENDS

Research & Public History Manager (maternity cover)

Bergit manages the Collaborative Doctoral Award Partnership scheme and supports the activities of the department. Bergit works with other museum and archives organisations to develop the expertise and structures for research into collections. Currently Bergit also works on her own doctoral research at Royal Holloway, University of London, and curates contemporary art works at the Natural History Museum in Berlin.

ROBERT BUD

Research Keeper

Robert is Research Keeper and an Arts and Humanities Research Council Leadership Fellow. He is carrying out a major project on the history of the concept of applied science from the fall of the Bastille to the raising of the Iron Curtain. Having previously published books on the histories of antibiotics and of biotechnology, he is now developing understanding of applied science in the post-Second World War era through a new research project on the history of Britain's civil nuclear power industry.

ADAM BOAL

Research and Public history Coordinator

Adam is responsible for coordinating the research and Public History department, providing support for and assisting in the wide range of activities the team are involved in. He organises the programme of events held by the department such as conferences, talks and seminars. He also provides support to the collaborative doctoral students, research associates and fellows.

KATE STEINER

Science Museum Group Journal

Kate is Editor of the Science Museum Group Journal, an open-access online journal publishing peer-reviewed articles relevant to the Science Museum and the three other national UK museums within the Group. Previously Kate was Head of Audience Research at the Science Museum and has worked in Exhibitions and Learning.

RICHARD NICHOLLS

Assistant Editor, Science Museum Group Journal

Richard is the Assistant Editor for the Science Museum Group Journal, a new publication which presents the global research community with peer-reviewed papers relevant to the wideranging work of the Science Museum Group.

PETER MORRIS

Research Fellow Emeritus

Peter co-authored Robert Burns Woodward: Architect and Artist in the World of Molecules (Chemical Heritage Foundation, 2001), edited the Museum's official history Science for the Nation (Palgrave, 2009) and recently completed The Matter Factory: A History of the Chemistry Laboratory (Reaktion, 2015).

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