

RESEARCH & PUBLIC HISTORY

Second Annual Report 2015–2016

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Front cover: Women workers using lathes at the Lancashire & Yorkshire Railway's Horwich works, May 1917. We chose this photograph as our emblematic image for the Artefacts programme in October on 'Understanding Use', part of our broader 'histories of use' research project.

“Research plays a critical role in allowing us to share and understand more of our collections than is possible through exhibitions and galleries alone.”

Foreword

SARAH DRY
SCIENCE MUSEUM GROUP TRUSTEE




With some 425,000 objects and seven million photos and library and archive items in our holdings, we can publicly display just a fraction at any given time. Research plays a critical role in allowing us to share and understand more of our collections

than is possible through exhibitions and galleries alone. This second annual report on the activities of the Research and Public History group is bursting with evidence of the range and creativity of research under way. Research, it is clear, takes many forms within the Science Museum Group (SMG). It is historical scholarship on the objects held in the Group's collections. It is investigations by conservation scientists into how best to preserve our unique collections. And it is inquiries into the nature of our audiences and how they learn. If there is one thing that unites all of this work today, it is a commitment to being mindful about what and why we choose to research.

There is a tremendous energy in the Group right now for looking again, and in some instances for the first time, at objects and collections that have gone neglected. Attention is being given to 'unloved' objects and difficult topics, from medical inhalers, sound and infrastructure to nuclear energy. Similarly there is a conviction that to be meaningful research must engage with as wide a range of audiences as possible. The concept of 'science capital', a new way of thinking about how individuals and societies engage with science that we have developed in collaboration with King's College London, has become increasingly important to the work of the Group and is now a core strategic goal. The research initiatives under way are one part of the many ways in which SMG aims to increase science capital in individuals and in society at large.

Research is inclusive in another way. It is a key area in which the combined strengths of the Group – made up of five main museum sites – can be most keenly felt. A shared culture of research and a commitment to understanding our complex and disparate collections as a singular resource makes SMG much more than the sum of its parts. The collaborative projects that are under way and those that are planned for the future similarly enable the Group to reach even further and to forge connections with institutions and individuals from whom we can learn and with whom we can share.

The evidence in this report makes it clear that research is a thriving and increasingly essential aspect of SMG, and I commend all of those involved for their hard work and passion in making it so.



Science Museum Group research: 2016 retrospect and prospects

TIM BOON
HEAD OF RESEARCH AND PUBLIC HISTORY

In many ways, the defining event for the Science Museum Group's research enterprise this year was our inaugural conference, on which Alison Hess writes elsewhere in this report. I suggested in my introduction there that the conference was like a railway terminus, in that it was both a point of arrival and a point of departure for SMG's research enterprise. Over five years we have moved from a position in which research of academic quality was the preserve of the very few, almost exclusively undertaken in private hours, to an activity that is emblematic of the Science Museum Group, and found in all its individual museums. Ian Blatchford set the tone in 2012, declaring that 'the Museum ... needs to be at the forefront of scholarship and innovation', going on to argue that such a commitment 'embraces the latest insights into the history of science, technology and medicine; greater understanding of the impact of educational programmes; and fresh thinking on making world-class research understood by wider society'.

It has been a pleasure for our department to work with colleagues from across the SMG museums to seek to fulfil this strategic ambition, which might be stated most simply as 'creating a research culture'. The fact that I have been invited on several occasions to speak at other national museums and university departments on that very topic shows that people have noticed what we are doing. When I give those talks, I explain how the SMG research enterprise is built on three pillars: the doctoral scheme, the e-journal and the Research Centre.

Our collaborative doctoral partnership, funded by the Arts and Humanities Research Council, forms the backbone of our research enterprise. Under the first grant we awarded 24 studentships starting in the years 2013, 2014 and 2015, and in 2016 we recruited the first students under the second award, who started at the end of the

period covered here, in October. We are delighted to work with our consortium partners – the Royal Geographical Society, the Royal Society and BT Archives – in enabling this major tranche of study into our collections and concerns. As it amounts to 72 years' worth of research so far, with another 54 years in the second award, this alone must be one of the world's largest research enterprises into the history and material culture of science and technology.

In the year under review we published the fourth and fifth issues of the *Science Museum Group Journal*, our refereed, open-access, free online journal. With more than a thousand subscribers and up to 150 views per day, this is rapidly becoming established as *the* forum for people who share our interests in the history of the visual and material culture of science, in the audiences for science and museums, and in the conservation of machines, equipment and instruments. An innovation of the fifth issue was to include four of the conference papers as pre-publications. Later editions of the journal will continue to feature papers from the inaugural conference, as well as from the other conferences we hold.

The inaugural conference was specifically celebrating the opening of the Dana Research Centre and Library, which we see as the third pillar supporting our research enterprise, although our northern museums have analogous facilities for collections access and study. With its beautiful reading room and adjacent office space, this is the 'mother ship' of our research enterprise. It is not simply that, with this facility, we are able to make our library and archive collections fully available in a way that has been impossible for a decade, it is also that we have a home for our research projects, for our fellows and students, and for a lively programme of conferences and workshops, which is designed to exemplify and reinforce our research enterprise; several of these events are the outcomes of research projects in which we are project partners.

A research culture necessarily consists of a network of connections. In our case there is a dense web of associations between the journal, the doctoral programme and our other research projects, all based at the Research Centre. But there is also a network of connections between our museums and our close associates in the universities, the other heritage Independent Research Organisations and science museums worldwide. These are the connections that enable our research to thrive.

I said that the conference, as much as it was an arrival point, was also a point of departure. Let me say just a little about the journey to our

destination, which is to become a museum group that has high-quality research at its heart. Our 'three pillars' will be crucial to the outward, as to the inward, journey.

First, we will continue to nurture our doctoral programme. Here we are always seeking research projects to support the known forward programmes of our museums and of our consortium partners. But we also want to identify promising aspects of our collections for research leading to potential future displays. Within a year it will be time to apply for the third tranche of collaborative doctoral partnership funding. With a likely five-year duration, this third tranche will provide the opportunity to embed doctoral research as an entirely normal part of what our museums do, given that the last of those students will be completing their studies a decade from now.

Second, the e-journal is ours to deploy as a tool of our research enterprise. Working with the Editorial Board and all contributors, we cannot afford to rest in our efforts to build the reputation and usefulness of this publication. Given the boost of the conference, we are confident in a strong supply of relevant submissions to fascinate and stimulate our readers. This sapling is not an acorn any more, but it has a long way to go before it is truly a mature oak, and we look to our collaboration with many in the museum sector and in the universities to ensure its growth.

Third, the Research Centre and Library. I have always been of the opinion that a research culture is not the kind of thing that arises of its own volition; it needs to be promoted and nurtured, and so we need to continue to set up daring initiatives if this facility is to receive the use it deserves. Our Research Centre conferences will continue to support and drive our research agenda. I invite all readers of this report – established scholars as well as students – to come and use the reading room, to use the delivery service to call up items from across our library and archive collections, and to make the Research Centre the favoured home for your research work. For our part, in the Research and Public History department, we are building a programme of research funding applications, fellowships, associateships and studentships in support of the museums' programmes and the meta-themes. We are looking for collaborators in funding applications; if you do not yet work with us, then we invite you to get in touch to explore possibilities. Details of our projects and initiatives can be found on the 'Research' web pages in the 'About us' section of the Science Museum website.

Science Museums and Research: The Dana Research Centre and Library Inaugural Conference

ALISON HESS
RESEARCH AND PUBLIC HISTORY MANAGER

The Science Museum Group's research community – staff, students and collaborators from universities and other museums – gathered together just after Easter 2016 for a conference to inaugurate our new research centre. Over three days, some 50 presentations took place covering the whole range of our active research, including work investigating objects and collections, and projects seeking understanding of audiences and how they learn. Our speakers included eminent colleagues from museums abroad, universities at home, our own curators and some registered for doctorates in collaboration with our four museums.

The tone and ambition of the conference – to summarise our research enterprise so far and to promote the next round of work – was set in some words of welcome from Dame Mary Archer, Chairman of the Science Museum Group, and in the opening plenary given by Professor Ludmilla Jordanova, of the University of Durham and a Science Museum Trustee. The opening plenary focused on 'Science and its publics', exploring institutions, their histories and audiences. The conference included panels, paper sessions, workshops and plenaries that spoke to the three meta-themes framing research in the Science Museum Group: (1) the public culture of science and technology; (2) science, technology and the arts; and (3) the material culture of science and technology.

The first strand of sessions interrogated the public culture of science in the present and past. For example, 'Beyond the museum: have participatory methods changed the role of museums?' explored how working with publics beyond the museum can lead to a deeper understanding of museum collections. 'New directions in museum learning research' presented the new ways in which museums can support formal and informal learning in museums. Both sessions raised questions about how museums can make the most of the knowledge, experiences and skills of their visitors.

The interrelationships between science, technology and the arts were the focus for the second strand. 'Music, technology and science' explored the history and use of music collections in science and technology museums. The session considered the broader social, cultural and historical contexts of sound, noise and quiet. It also considered the unlocked research potential of largely silent collections of musical instruments. A session on 'Researching photography' also addressed the boundaries between art and science through case studies of photographic collections. This session raised questions that ranged from the role of archiving practices to the impact of the introduction of colour photography.

A third strand focused on the myriad ways that the materiality of collections opens up new questions for research. In the 'Interpreting material culture' session we heard about provocative new approaches to material culture from Jon Agar at UCL and Mungo Campbell at the Hunterian, University of Glasgow, followed by case studies on telegraphy, clocks and the infrastructure collections. The materiality of objects is perhaps most significant in the work of conservators, a theme drawn out by three papers looking at specific conservation interventions. These included a detailed look at the conservation work on Flying Scotsman, a historical survey of the repair of doped-fabric aircraft and the use of innovative new building materials in museums storage.

Complementing the themed paper sessions were a range of influential keynote speakers. Professor Elizabeth Pye, Emeritus Professor of Archaeological and Museum Conservation at UCL, demonstrated the ways in which an object's biography relates to conservation decisions, particularly when deciding whether to operate historical objects. In his plenary, Jean-Francois Gauvin, Lecturer for the Collection of Historical Scientific Instruments (CHSI) at Harvard, also engaged with objects by considering how their

aesthetic qualities are often prioritised over their functional qualities in museums, and called to redress this balance. From a close engagement with the materiality of collections to the relationship of museums to their public: Ken Arnold, Head of Public Programmes at the Wellcome Collection, considered the balance between the central role of research in museums and creating an environment that is engaging and intellectually stimulating for the wider public.

The final panel drew together many of the discussions that had taken place over the course of the conference by considering the potential for collaboration between museums and universities. Exploring these questions were Felix Driver, Professor of Human Geography at Royal Holloway; Graeme Gooday, Head of the School of Philosophy, Religion and History of Science at the University of Leeds; and Bill Sherman, Director of Research and Collections at the V&A; with Suzanne Bardgett, Head of Research at the Imperial War Museum, in the chair. The discussion covered topics such as the relationship between research and exhibitions; the potential for science museums to learn from ethnographic museums' research; the model for research that can be provided by revisiting the history of Albertopolis; and the opportunities to 'escape from the curriculum' that collections-based research provides. In particular, our panellists pointed out the positive impact that collaborative doctoral work has had on pushing forward research in museums and developing a more sophisticated understanding of 'impact' within universities. This reflects the experience across the Science Museum Group, which has a long history of supporting collaborative doctoral research and continues to see the benefits that students bring.

The inaugural conference was a celebration of research across the Science Museum Group in the space designed to enable it to flourish. In this spirit, the discussion continues in the pages of the *Science Museum Group Journal*, with a special issue published before the conference and a number of further articles planned for future issues. While the inaugural conference offered an opportunity to take stock and reflect on the exciting work that has taken place across the Science Museum Group over the years, it also presented an opportunity to look to the future and the new directions in which research in museums might take us.



Professor Yves Winkin, Director of the Musée des Arts et Métiers in Paris, inspecting a manuscript during the Inaugural Conference.

Alternative Histories of Electronic Music

DR JAMES MOONEY
LECTURER IN MUSIC TECHNOLOGY, UNIVERSITY OF LEEDS

In April 2016 an international conference entitled Alternative Histories of Electronic Music (AHM) was staged at the Science Museum's Dana Research Centre, as part of an AHRC-funded research project led by the present author in partnership with Dr Tim Boon, Head of Research and Public History at the Science Museum.

The purpose of the conference was to explore the many ways in which electronic music's history can be studied, researched and told. Trevor Pinch (Professor of Science and Technology Studies at Cornell University) described how we might research electronic music by examining its social and material cultures, tracing the uses and users of technologies wherever they lead us. Sarah Angliss, a performer and Visiting Researcher at Goldsmiths, University of London, discussed 'folk histories' of electronic music, exploring the revered status in popular culture of devices such as the theremin, and the fetishisation of modular synthesisers in online forums such as MuffWiggler. Simon Emmerson approached the topic with a near-archaeological examination of the past 40 years of electronic music, as represented by its 'sedimentation' in the literature, while Leigh Landy challenged the very 'electronic-ness' of electronic music by proposing an alternative category of 'sound-based music' – music based on timbres rather than notes, which may or may not be electronic. (Both Emmerson and Landy are Professors of Music, Technology and Innovation at De Montfort University, Leicester.) Georgina Born posed the question, 'How can and should we write alternative histories of electronic musics?', thus addressing the historiographic theme of the conference head-on. Arguing against a canonical stance, she urged musicologists to attend to the myriad materialities, cultures, ideologies, discourses and social mediations that make musical cultures and practices what they are.

Fifty presentations were delivered in all, focusing on topics such as influential individuals and institutions (beyond the obvious ones), live electronics, electronic music before 1945, DIY approaches, and digital and mechanical automata, as well as a range of different international perspectives. The conference was well received, being variously described by attendees as 'a ground-breaking collection of engaging

presentations', 'a signal moment in the growth of electronic music studies', 'a genuine eye-opener into the myriad ways one might think about the history of electronic music' and 'a formidable benchmark for others which must surely follow'. A video proceedings, comprising abstracts for all the presentations delivered and video recordings of many of them, is in preparation at the time of writing, and will soon be available via the University of Leeds's Research Data Repository (<http://archive.researchdata.leeds.ac.uk>). In the meantime, abstracts are available via the conference website (<http://ahem2016.wordpress.com>).

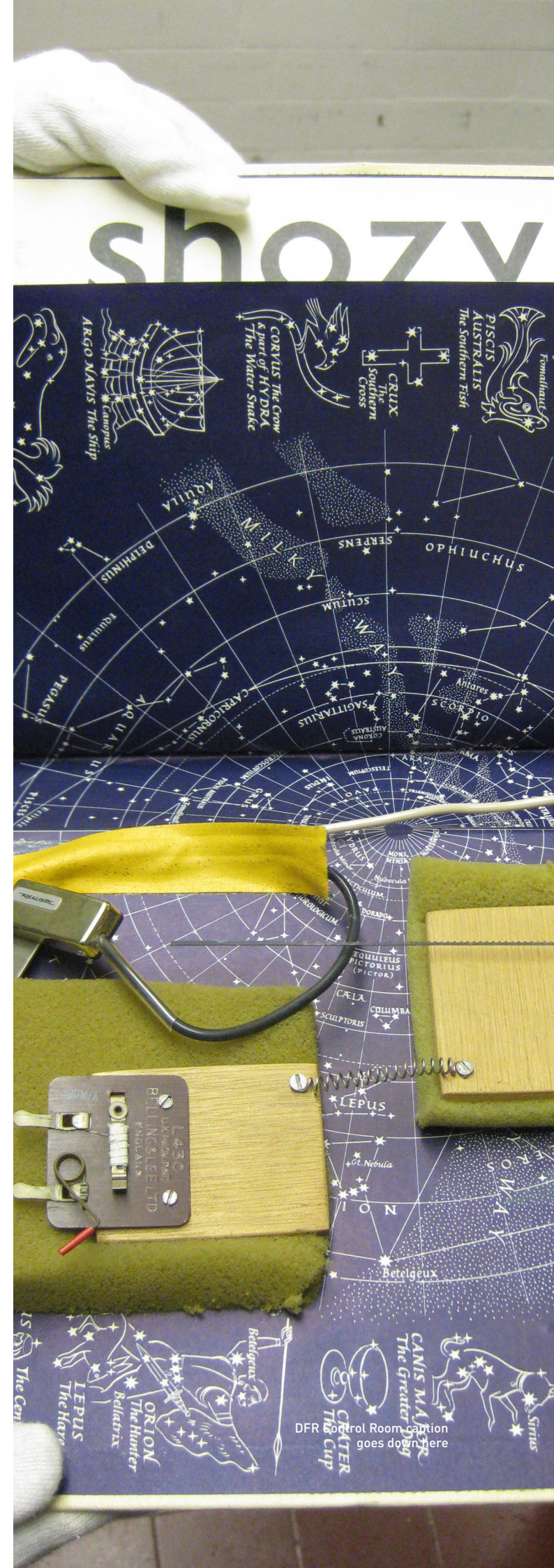
One might ask: why stage a conference on electronic music history in a museum?

One reason is that, as the post-Second-World-War generation of electronic music innovators leave their legacies behind them, it is museums and archives that will become the custodians of the material artefacts that remain. An example of this trend is the Hugh Davies Collection, a cache of self-built electroacoustic musical instruments and electronic sound apparatus built, modified and used by the English musician Hugh Davies (1943–2005), acquired by the Science Museum in 2007. The collection represents a unique, primary, material record of Davies's activities, and has played a key role in the present author's own research into Davies's contributions to experimental electronic music from the 1960s onwards. Reciprocally, the present author has provided extended descriptions of the objects for the Museum's records, drawing upon extensive study of archival documents held at the British Library. (Several objects from the collection were featured in the Museum's temporary exhibition *Oramics to Electronica* in 2011, as part of a project exploring lay understandings of electronic music history.)

Another reason is that electronic music represents a point of contact between science and the arts; a space where technological innovation meets creative experimentation. Therefore, it is museums of science and technology in particular that present themselves as a logical site for the preservation and interpretation of electronic music's material culture.

Work in the areas of electronic music history and

material culture in collaboration with the Museum is ongoing. A special issue of the international journal *Organised Sound*, co-edited by the present author, Tim Boon (Science Museum) and Dorien Schampaert (Research Associate at the University of Leeds), is in preparation and will appear in print in September 2017, while in May 2017 Professor Trevor Pinch will begin the first of two three-month visits to the UK, funded by a University of Leeds grant initiated by the present author. During this time Professor Pinch will work with both the present author and the Science Museum on a project entitled Exploring Material Cultures of Electronic Music Through the Methods of Science and Technology Studies.



Artefacts conference, 2–4 October 2016

TIM BOON
HEAD OF RESEARCH AND PUBLIC HISTORY

OLI BETTS
RESEARCH FELLOW, NATIONAL RAILWAY MUSEUM

In early October, the Research Centre hosted the 21st meeting of the Artefacts consortium in a three-day conference on the theme 'Understanding Use: Science and Technology Objects and Users'. Artefacts describes itself as 'an association of historians of science and technology, mostly in museums and academic institutions, who share the goal of promoting the use of objects in serious historical studies'. The Science Museum started this consortium in



Women workers using lathes at the Lancashire & Yorkshire Railway's works, 1917

partnership with the Deutsches Museum and the Smithsonian Institution two decades ago, with the aim of increasing research and discussion that engages with the collections of science museums. It is fitting that Artefacts should have celebrated its 21st birthday at our new Research Centre. It has held an annual meeting since 1996, with around half the meetings leading, in due course, to a collection of essays. The Science Museum was the venue for that first meeting, and this was the fourth to be held here (after gatherings in 2002 and 2009).

Twenty-one years is quite an accomplishment for

an organisation that runs only on shared concerns and mutual generosity. The achievement includes some 450 individual papers, tackling themes as diverse as electronics, environment, pictures, globalisation and instruments (musical as well as scientific). The consortium's members have visited 13 cities and explored their museums, and have produced nine books of essays deriving from our meetings, with a tenth imminent. But perhaps the greatest achievement of Artefacts has been that so many individuals and institutions have wanted to join the club. We should remember that, at the start, this was a daring idea by a very small group of people at the Science Museum, Deutsches Museum and National Museum of American History: a conspiracy of self-improvement, perhaps. In the early years the meetings tended to alternate between these three parties. But now they take place in the museums of new partners, in cities as diverse as Milan, Edinburgh, Ottawa and Oslo.

Across these two decades the fates of all our museums, and of research in science museums, has fluctuated. But in many respects we can say that the increasing success of Artefacts has been part of a general improvement in what we hold dear: new and better understanding of the material culture of science.

Every year a different theme is proposed; this year it was 'Understanding Use: Science and Technology Objects and Users'. The theme arose in discussions with Yves Winkin, anthropologist and Director of the Musée des Arts et Métiers, Paris, at the 2015 Milan Artefacts conference, when we discovered a mutual interest in the tacit: the unspoken and largely unrepresented ways in which the objects in our collections were made or used during their working lives. We determined to hold twin conferences in 2016 and 2017; as it turns out, the London Artefacts conference came to be concerned with the use of completed machines, instruments and equipment, whereas in Paris we will be more concerned with the making of things. But the conference's core concerns also emerged from the emphasis that we chose to put in the Science Museum's *Information Age* gallery on our ancestors' experience of old communications technologies when they were new. This resonates with the turn to users that we have seen in science and technology studies, marked by the publication of key texts such as Oudshoorn and Pinch's *How Users Matter* (2003), Edgerton's *The Shock of the*

Old (2006) and Oldenziel and Hård's *Consumers, Tinkerers, Rebels* (2013). We argue that museums, curators and collections have special contributions to make to this trend in science and technology studies, just as university-based researchers can help us museum people to reinvent our curatorial purpose once again. In other words, histories of use is an ideal topic for an Artefacts meeting, representing a meeting point for the best in science museum practice and modern scholarship.

But we would like to go one stage further. It is not only humanities-style research and conservation science investigation that happens in museums: there is social science too, in the shape of audience and learning research, and that is generally conducted by different people in different departments. We want to propose that a focus on users can offer a route to a *rapprochement* between object-related research in museums and that other kind of museum research, visitor research. And that is for the reason that, surely, visitors are themselves users of museums. And so, because we understand the relationships between objects and people in the past, we can apply that understanding to the users of our exhibitions in the present. Equally, the myriad of ways in which social research has sought to understand the responses of visitors and other audiences holds out the promise of many registers in which artefacts in use may be understood.

The conference programme reflected both the high quality of abstracts we received and the complexities of the discipline in which we work. It explored the presentation of the histories of science and technology within the museum context, balancing the demands of world-class research and public-facing output, all within a shifting political and cultural landscape. In putting together the programme for the 21st conference we endeavoured to reflect the interplay between object, user and public display.

There were two framing keynote papers, one from the Smithsonian's Martin Collins reflecting on the problem of the 'self' in technological museums, and at the close Sam Alberti from National Museums Scotland explored how

scientific museum objects had been used at his museum. Framed by these two keynotes were 23 papers spread across four sessions and a number of individual slots. In the first session delegates learned about unused collections, the relationship between colonial bureaucracy and its researchers, and the ways that museums conceal histories of use. The first evening saw the premiere of the new score to the 1928 film *The Building and Operation of Industrial Museums*, the fruit of a project described elsewhere in this report.

On the first full morning, speakers explored the use of instruments of science, early modern clocks and German cipher machines, not to mention more everyday objects – toothbrushes, toy construction sets, penicillin – to further explore the interplay between users and objects. That afternoon, speakers re-created scientific contexts as papers considered laboratory life in Milan, the fully automated cloud chamber in Florence's Officine

Galileo and the users of celestial cartography, before exploring the re-enactment of a 1913 recording of Beethoven.

Finally, the third day moved into issues of public display and museology. In the morning we heard how epistemic artefacts are displayed, how computers can be staged as objects of use, how the Science Museum exhibited for blind visitors in the post-war period, and how a collection of uniforms could be made to illuminate female participation in the war effort, and citizenship. The final session provided a

stage for audience research; in the terms of the conference, how visitors may themselves be seen as users of museum displays, covering embodied user interfaces, audience participation in the Science Museum's *Wounded* exhibition, and helping visitors to think like historians.

Overall, we organisers were delighted with the way the papers interrogated the theme; the small experiments in structure (including the concert and rather more papers than previously) all worked well. We propose, as a final innovation, to create a conference volume out of this meeting and its successor in Paris next year.



Visitors at 1950 special exhibition for the blind, the subject of Jean-Baptiste Gouyon's Artefacts presentation.

Science Museum Group Journal – steady growth and a promising future

KATE STEINER
EDITOR, SCIENCE MUSEUM GROUP JOURNAL

Introduction

Since its birth two and a half years ago the *Science Museum Group Journal* has successfully published six issues. It has consolidated its personality, maintained academic standards of content and steadily grown its readership. The e-journal is beginning to take root, establishing itself as a lively and robust outlet for both SMG and international research, and contributing to the reputation of the Research and Public History Group. The following article looks at the development of the journal up to this point, discusses its strengths and the challenges faced, and looks forward to a programme of future growth.

Origins and the story so far

The *Science Museum Group Journal* sprang from a renewed focus on research under Director Ian Blatchford, who saw an opportunity for the Museum to be more outward-facing and to participate fully in the international research community. With internal funding and the full support of the Trustees, current Editor Kate Steiner was able to create a gold-standard open-access fully online journal, which launched in spring 2014. The aim of the e-journal was to 'present the global research community with peer-reviewed papers relevant to the Science Museum Group's collections and practice and to the wider international Science Museum community'. This was to be a new platform for discussion about science: its history, material culture, communication and presentation in museums.

In accordance with our original vision we have published two issues per year (in spring and autumn) with each issue containing a mix of five or six longer research articles and three to five discussion pieces, reviews and obituaries. There have been two themed issues, one on communications (spring 2015) marking the opening of the *Information Age* gallery at the Science Museum, and one on research in museums (autumn 2016) partnering the Research Group's inaugural conference. It is notable that issues so far have made good use of the e-journal's ability to feature almost limitless images, as well as audio, film and multimedia. This has not only created a visually striking publication, but allows readers to

access and interrogate museum collections and the wider material culture of science.

Content

The e-journal has maintained academic standards (double-blind peer review and rejection of articles that do not meet the standard) while experimenting with formats. Particularly fruitful, for example, have been the 'object focus' articles in which authors present a detailed analysis of a single object – William Bally's set of phrenological heads, Winifred Penn-Gaskell's scrapbook and Kazuo Ishiguro's storm surge prediction machine are examples.

We recognise the importance of encouraging submissions from across the family of museums in the Group and from the many different areas of research (for example conservation and learning as well as curatorial). We have had some success here publishing articles on the renovation of *Flying Scotsman*, on the BBC nightingale concert broadcasts and on conservation of doped-fabric aircraft, for example. But we want to do more to encourage a culture of academic writing and publishing across the Group. On an individual level the Editor has been working with internal authors unused to academic writing, rereading early versions, suggesting subject-specialist readers and mentors or setting up co-authorships. At a strategic level we encourage collections of articles on specific research areas in the Group – for example issue 07 will be themed around sound and vision to spotlight new directions of work at the National Media Museum. Similarly, we take seriously our role in encouraging younger academics outside museums. In September this year we announced a new writing prize for early-career scholars which will be judged and awarded in spring 2017.

One of the challenges of such a new journal is to attract a good quantity of quality external submissions. Early issues relied somewhat on commissioning articles through our academic networks. More recently this has changed and there are now submissions waiting for publication up to issue 09 in spring 2018. In part this is due to increased awareness of the e-journal and extended activities of the Research Group. But in addition the e-journal Editor and Head of Research collaborated

very effectively to ensure that papers presented at the inaugural conference would be written up to appear in the journal. This greater pool of content gives us more flexibility, allowing us to publish complementary content together and meet the needs of scholars who need longer time frames to submit.

Production and design

The online format continues to work well for readers on any device. The submission process is also proving efficient, with authors able to submit articles using simple Word documents. The content management system gives the editorial team full control of uploading articles and images within the designed framework. We are not only able to fix any errata immediately but can load content according to our own timetable, rotate content on the issue home pages so they are refreshed, and identify and implement small improvements.

This ongoing maintenance is carried out very efficiently using a small operational budget and a rolling contract with the original contractor. This relationship not only allows us to fix technical bugs but means we can also make continual small improvements. For example, in autumn 2015 we were able to introduce a link between a footnote citation in the text and the note itself, so that readers can easily consult the note and click back to the correct place in the text.

Editorial Board

The e-journal's Editorial Board has met annually as envisaged, including some attendance by international members. It has provided enthusiastic and valuable support over the past years, with members suggesting authors, distributing flyers at international conferences and participating in the inaugural research conference. A system for staggered membership renewal was devised, and in autumn 2016 a proportion of members were replaced and there was a smooth transition of the Chair from Professor Jim Bennett to Professor Justin Dillon. It was agreed that despite an adequate budget it was logistically difficult for international members to attend the Board Meeting. An International Advisory Board was therefore created, which will participate via online communication. Memberships of both boards are posted on the e-journal website.

Building awareness

Building the presence and reputation of such a new journal was an early challenge. We have worked to build up awareness in a number of ways: paper leaflets are distributed at conferences and as flyers within established paper journals (including *British Journal for the History of Science*), and both Editorial Board and Research Group staff personally promote the e-journal at workshops and conferences. We have developed online communication through academic lists, the quarterly online newsletter and social media posts, especially around publication dates. Spikes in readership figures around publication suggest that the message is getting through.

Looking forward

As the *Science Museum Group Journal* enters a more established phase we have the opportunity to take stock and plan for the future. The e-journal should not stand still but will continually improve, reflecting

the lively growth and innovation of SMG research itself as well as the latest developments in online publishing. The editorial and Research teams have already identified some areas for improvement: the wish to publish additional material outside the journal time frame but with the same professional finish; a possible discussion facility within the e-journal allowing authors to write and respond around a curated thread; a more dynamic home page to better reflect the journal's personality; and a possible title change with a strap-line to clearly convey the journal's vision.

A study of options for resolving some of the above needs is being commissioned for the end of the financial year. We are therefore in a position to plan for even greater success in the immediate future and years to come.



Euclid's Elements of Geometry from Glyn Parry's review of the John Dee exhibition at the Royal College of Physicians.

History of Nuclear Energy and Society

STUART BUTLER
RESEARCH FELLOW

The Science Museum has been undertaking research as part of a major European project, the History of Nuclear Energy and Society (HoNESt), funded by Euratom (the European Atomic Energy Community) and the European Commission's Horizon 2020 programme, since October 2015. This major project links historical research to the understanding of contemporary attitudes. It examines how nuclear energy and society have interacted across Europe and the world, from 1945 to the present day. The Science Museum is responsible for the historical interpretation from a British perspective.

HoNESt is an interdisciplinary consortium of 24 institutions and a collaboration of historians and social scientists. Taking place over a period of three years, the project has begun with a focus on understanding the history of nuclear energy in the 21 countries examined, and short country reports for each nation will soon be made available on the project website (honest2020.eu).

My work at the Science Museum as a Research Fellow, supervised by Dr Robert Bud (Research Keeper), focuses on understanding the British experience of nuclear energy utilising local, national and Science Museum-held collections. By investigating public interactions with nuclear energy, this project highlights a new approach in understanding the progress of the British nuclear programme, and provides greater information for understanding present debates about nuclear energy. Although much work has been done by historians examining the political, economic and technological frustrations and achievements of Britain's nuclear power programmes, little work has examined the impact and effect of the broader relations between nuclear technologies and civil society.

Our research provides the opportunity for a reassessment of the history of Britain's nuclear energy experience. Existing histories, rooted in the early 1980s, suggest that the British nuclear experience has been one of mild failure due to the development of expensive and unique reactor types which were less efficient and less exportable than those chosen by the United States and Soviet Union. With hindsight from today, this characterisation requires re-evaluation. Across

the West nuclear power has proved controversial. Britain is distinctive because of apparent public confidence in its safety. The kinds of UK nuclear reactors connected to the grid have never suffered a major incident; instead they have exceeded their planned lifetimes, and provided reliable and economic base-load electricity for 60 years. Unlike citizens of many other European nations, the British public have remained broadly supportive of nuclear energy in spite of accidents in the nuclear industry abroad and incidents at home. Our work as part of HoNESt seeks to understand the interactions between the public and nuclear energy that have developed since the inauguration of Britain's first nuclear power station in 1956.

Although my research focuses on the British context, the great potential within the project lies in the research undertaken simultaneously in the other 20 countries and institutions participating. Efforts are under way to begin work on transnational publications investigating similarities and differences in national experiences and responses to nuclear energy in multiple countries. Comparing and contrasting experiences from around the world will highlight examples of successful and unsuccessful societal interactions with nuclear energy, whether these are government directed (for example through public consultation) or directed by the public (through protest). The historical analysis of these experiences will feed directly into the sociological analysis undertaken by our social scientist colleagues examining the present situation and 'backcasting' ideal futures.

Work on HoNESt at the Science Museum will continue until 2018, and in the autumn of 2017 the Museum will host an event in partnership with the Strand Group of King's College London. The event, taking the form of a witness seminar, will invite key policy-makers to discuss the political priorities and imperatives which directed the Labour government's decision to put nuclear energy 'back on the agenda' in 2006. This will form a small part of HoNESt's public engagement and dissemination programme, which will communicate the results of our research to stakeholders in industry and civil society.



Control Room at Dunreay nuclear power station,
recently acquired by the Science Museum.

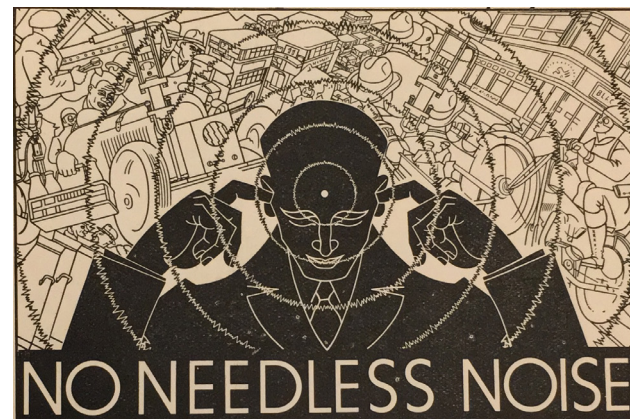
Listening to the museum

JAMES G MANSELL
UNIVERSITY OF NOTTINGHAM

Many museums are exploring the senses. In search of new ways to engage visitors, strict regimes of visual taxonomy and display have been relaxed in favour of soundtracked galleries where touch is encouraged and live performance is as likely an exhibit as a stuffed animal. *This is a Voice* at the Wellcome Collection made sound the main exhibit, and the Science Museum's own *Information Age* gallery is rich with the sound worlds of 20th-century communications technologies. As a historian of sound I am excited and fascinated by this new turn to sound in museums, but feel obliged, equally, to seek out its historical antecedents. My new book *The Age of Noise in Britain: Hearing Modernity* (University of Illinois Press, 2017) deals with a period of British history, 1914–45, in which a new technological revolution was experienced primarily through the ear rather than the eye. The possibilities and perils of the technological age seemed to hinge, in the pre-television-and-internet age, on the tremendous power of sound to reshape time and space. Radio and gramophone sets feature prominently in the literary and cultural imagination of this period, as do the noises created by newly prominent machines such as motorcars, typewriters, pneumatic drills and vacuum cleaners. When early-20th-century Britons described themselves as living in an 'age of noise' they meant that at the heart of the cultural and technological change they were living through was something *audible*, something best understood by *listening*.

In 2016 I spent time researching the Science Museum's place in the 'age of noise'. I was inspired to do so having been a co-investigator on the 2015 AHRC research network Music, Noise and Silence, with Aleks Kolkowski and Tim Boon, investigating strategies for incorporating sound and music into exhibitions. Thanks to the award of an AHRC Cultural Engagement Fund fellowship, Dr Jennifer Rich joined me at the University of Nottingham to undertake a project called Acoustics on Display: Collecting and Curating Sound at the Science Museum, which looked particularly at the history and display of the Museum's Sound Recording and Reproduction Technology collection. The Museum's wonderful collection of phonograph, gramophone and assorted other historical sound technologies is something to behold, but has not been on display, visibly or audibly, for more than

Pages from the Noise Abatement Exhibition catalogue, including the Anti-Noise League Logotype and advertisements.



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30 years. Dr Rich discovered a long and well-developed tradition of *sounding* these machines in the Science Museum's gallery spaces. She says more about this in her own entry in this report, including the workshop we held at the Dana Research Centre on 19 July 2016 on the topic of sound and museums.

Meanwhile, I set about doing some new research on the Science Museum's 1935 temporary exhibition on noise abatement, which had featured as a case study in my book. Funded by a fellowship from the University of Nottingham's Creative and Cultural Industries Research Priority Area, I dug a little deeper, examining the Museum's files as well as those held elsewhere, to piece together a little more about this exhibition. It turns out that it was full of sounds! Pneumatic drills were demonstrated in the Museum courtyard, a replica house with soundproofed and un-soundproofed rooms was built to demonstrate the varying transmission of domestic sounds such as vacuum cleaning and piano playing, and a live broadcast was even organised from the Houses of Parliament, which was played through a microphone into a tank of water to demonstrate how sound passes differently through water than it does through the air. I am writing this research up into an article for the *Science Museum Group Journal*, aiming to show that we might have a lot to learn from past attempts to make the museum sound.



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The silent lift in the Noise Abatement Exhibition.



Acoustics on Display: Collecting and Curating

JENNIFER RICH
UNIVERSITY OF NOTTINGHAM

A collaborative project between the Science Museum and the University of Nottingham, and supported through the AHRC Cultural Engagement fund, *Acoustics on Display: Collecting and Curating* explored historic techniques of display surrounding the Science Museum's extensive Acoustics collection.

As a relatively short project (just three months in duration), the research focused on one section of the Acoustics collection: the Sound Recording and Reproduction collection. Archival research traced how the collection was exhibited to the public, paying particular attention to the role of sound and listening in the process of displaying the Acoustics collection.

Tracing the keepers of the Acoustics collection in the 1920s, for example, revealed examples of how sound was used in the Museum as a tool for interpretation. In 1928 the Science Museum acquired an electric gramophone manufactured by the Gramophone Company which was installed on a platform overlooking the cavernous hall of the brand-new East Block. An amplifier and loudspeakers ensured that the popular symphonies and other orchestral music played on the gramophone could be heard across the Museum. Memos exchanged between Museum staff at the time revealed a belief in sound as the best medium to convey the technological capacities of the new electric gramophone. They reveal, too, the problem of sound as a potential source of interference in the relatively silent spaces of the Museum. A Museum order, issued in 1929, warned visitors that the electric gramophone would be switched off should listeners become unruly in its vicinity. Eventually the demonstrations were moved into the soundproof spaces of the lecture theatre in order to contain sound and to minimise its potential for disorder.

Archival materials surrounding the 1977 exhibition *The Trumpet Shall Sound* – a celebration of the centenary year of the invention of Thomas Edison's tinfoil phonograph – similarly captured reflections on the practicalities of acoustic display. The exhibition took the shape of an attic with sloping roof and ceiling joists, a nod to the way in which

collectors might store their phonographs and gramophones. A key feature of the exhibition was a spoken commentary, delivered by then Keeper of Physics Victor Kenneth Chew, which was interspersed with audio excerpts of records which would have been played by the objects at the time of their manufacture. The attic space provided a means of harnessing the potential of sound for education, for capturing the technological as well as the cultural significance of historic objects, while compartmentalising sound to avoid disturbance in other parts of the museum.

Overall, the research has cast a spotlight on a body of expertise which has the potential to support museum practitioners when using sound in their own displays. In July the Science Museum hosted a one-day workshop which brought together curators, collectors and academics. Talks were followed by a demonstration of vintage phonographs and gramophones, led by Science Museum Research Fellow Aleks Kolkowski and President of the London Phonograph and Gramophone Society Christopher Proudfoot, which illustrated what an acoustics display might look, sound and feel like.

At a time when museum practitioners are turning increasingly to sound as a tool for engaging with their audiences, providing opportunities for exchanges between curators and custodians of sound past and present is a valuable exercise. *Acoustics on Display* offers a point of departure for thinking up new ways of using sound in museums, and for realising the museum as a sonic space both at the Science Museum and beyond.

Museums of the New Age

JEAN-PHILIPPE CALVIN

For Ten months in 2016, I was Leverhulme Trust Composer in Residence at the Science Museum Research Centre. The creation of a score for a 1927 film showing Europe's principal science museums was my core focus. My work fell into three overlapping phases: familiarisation and research (January+); composition and communication (April-September); and performances and presentations (September-October). *The Building and Operation of Industrial Museums*, the 30-minute film selected to be scored during the research phase, was one of three made by proponents of 'The Museum of the Peaceful Arts', a proposed new science museum in New York City; at that point there were no such museums in the USA, and it was not unusual for their champions to come to Europe on fact-finding missions. In this case, Charles Gwynne, trustee of the museum, travelled with a film crew to create films to promote the project among New York elites. They filmed at the Science Museum London, Musée des Arts et Metiers in Paris, Deutsches Museum Munich, and the Technical Museum, Vienna.

I worked closely with the Research and Public History Department, benefiting from the Museum's extended research network of scholars and curators, several of whom helped to locate variant copies of the film and piece-together its fragmentary history. The most active of these was Jaume Sastre Juan, based at the University of Lisbon, who introduced the premiere performance, and who has published an article

on the background in the *Science Museum Group Journal*. (We plan to publish an account of this musical project for a future issue of the *Journal*.) I was able to contribute to the Museum's scholarly programme at two conferences and at a workshop on music and acoustics.

The project culminated in two Science Museum-funded performances of the score in October. The first was part of the 'Artefacts' conference in early October. As described elsewhere in this report, this attracts an international audience of university academics and curators interested in the history of collections and museums. It was therefore the ideal core audience for this work; along with members of the public, the audience numbered 145. The concert performance was repeated, with an introduction by Tim Boon, as part of the Manchester Science Festival on 28th October to an audience of 50. We are in discussions about further performances and about making a professional quality recording so that the whole can be made available online.

The project contributed strongly to the Museum's developing work relating to science, technology and music, and to that exploring the Science Museum's own history. Overall, the project helps staff of the museum – and those of science museums worldwide – to understand their own work in relation to earlier practice. The premiere has also served to whet international appetites for further research and events exploring the intersections of museums, films and history.

A year of research on the medicine collections

OISÍN WALL
ASSOCIATE CURATOR OF MEDICINE



Dr Carter-Moffat's Ammoniaphone, from the Museum's medical collections.

The Science Museum is developing five new permanent galleries displaying thousands of objects from our medicine collections, thanks to support from the Wellcome Trust, Heritage Lottery Fund and Wolfson Foundation. The galleries will open in 2019 and we are already hard at work writing the labels and preparing for the galleries to be built. One aim of the Medicine Galleries project has been to encourage greater academic engagement with the Museum's collections and, more broadly, to promote object-based and collections-led research.

The Medicine Galleries team has had an exciting year of research. We have worked with 22 researchers on different projects, taught both under- and postgraduates, and produced more research outputs than in the previous five years combined. At the heart of our research strategy has been an effort to develop an enthusiastic research community around the medicine collections by inviting researchers into the Museum to work with the curators. The Medicine Galleries Research Fellowship has been central to this.

This programme, generously supported by the Wellcome Trust, will bring as many as 20 scholars into the Museum, each for up to a year, to work on aspects of the medicine collections. Our first two fellows will start in January 2017. Three fellows on secondment from universities have also joined us: two Oxford TORCH fellows, Professor Barry Murnane and Dr Melissa Dickson, as recounted elsewhere in this report; and a CHASE fellow, Harriet Barrett Dorling (Sussex), working on the psychiatry collection.

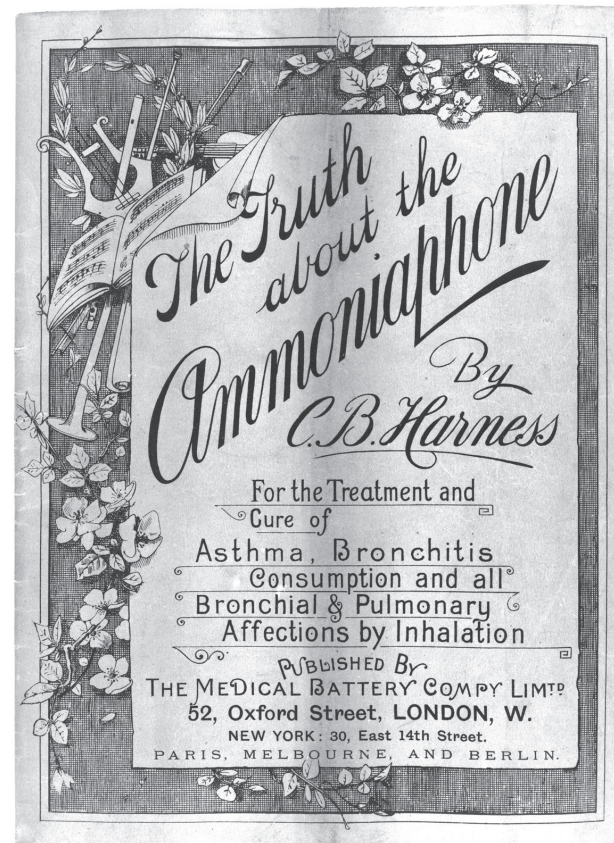
As well as the fellows, we are working with three AHRC-funded collaborative doctoral students: Laura Newman, co-supervised with King's College London, is researching medical education and germ theory and has been working with the Medicine Galleries team on an important collection project; Gemma Almond, co-supervised with Swansea University, is researching the history of spectacles; and Caroline Avery, co-supervised with Leeds University, was just starting work on the early industrial production of stethoscopes in October 2016. Finally we have had 15 researchers working on short research

projects. These were early-career researchers working on subjects feeding directly into the content development for the galleries project. These projects ranged from research on our extensive collection of amulets to an object biography of an early mobile kidney dialysis machine.

This growing research community has produced some exciting collaborations. For instance, in the course of her doctoral research Laura Newman discovered a trove of historic objects from a former tuberculosis sanatorium. She is now working with curators to collect these, making an important addition to the Museum's medicine collections. Meanwhile Barry Murnane has been working with the Medicine Galleries team to organise a workshop that will bring together curators with object-focused theorists. The workshop will attempt to find a common language and open discussions between the theory and practice of object research.

As well as bringing in all of these new researchers, the Curatorial team has been working day in day out, researching the objects that we will be displaying in the new galleries. Their research outputs have ranged from conference panels to articles, book chapters and a monograph. Our topics have been as varied as the collections we work with – from the histories of statues of medieval saints, to the institutional politics of psychiatry in the 1960s, to more self-reflexive pieces on changing museological practice. Since the start of 2016 we have produced 17 research outputs, a number that will continue to grow as our curatorial team gets bigger and as we work more collaboratively with researchers.

It has been a busy and fascinating year of research, and we are geared up to continue at the same pace next year. However, the real work of the research strategy is only just beginning. Over the next few years we will be building a self-sustaining community, one which will continue to grow and produce exciting research based on the medicine collections well beyond the opening of the new galleries. Looking ahead to 2017 we will also be focused on strengthening our relationships with researchers, and encouraging people we have worked with to continue to engage with the Museum and our collections through new projects or research-led teaching.



Pharmacy as a Laboratory of Modernity

BARRY MURNANE
UNIVERSITY OF OXFORD

In spring 2016 I became the first Oxford TORCH Knowledge Exchange Fellow to be based at the Dana Research Centre, where I conducted research on my project Pharmacy as a Laboratory of Modernity. Collaboration between the Science Museum and university-based academics is an increasingly important element of the Museum's research agenda, and knowledge exchange is an ideal way of developing new paradigms based on curatorial expertise while also offering university academics new methods of disseminating their research. Collaboration between the Museum and Oxford academics is not new, but this KE Fellowship, sponsored by the Andrew W Mellon Foundation and awarded by The Oxford Research Centre in the Humanities (TORCH), provides a more formal basis for working together.

Modernisation is determined by the master narratives of medico-scientific, economic, industrial and cultural production/innovation. In so far as the cultural, scientific and medical practices of making and consuming medicines unite these processes, pharmacy can be identified as a laboratory of modernity. *Pharmacy* (the discipline), *pharmaceuticals* (the materials) and the *pharmacist* (their author) were key domains in which modern scientific, medical and economic idioms were developed and tested. As such the purpose of my fellowship was to engage with the *material* dimensions in the therapy of the human person in the 19th century to tell the story of actual medicines and the technological conditions of their discovery and delivery, using pharmaceutical technologies and materials as the basis.

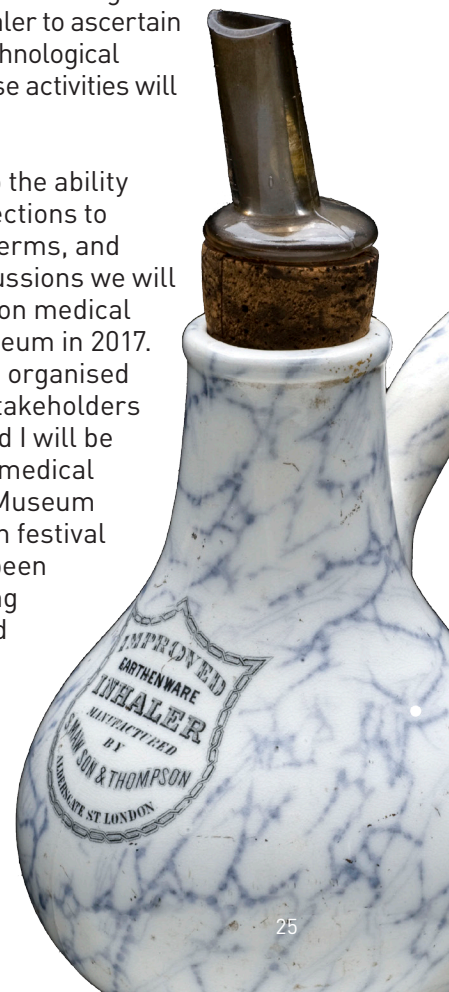
My chosen focus during the fellowship was on lung disease. In the modern period rapid urban development led to a peak in respiratory ailments such as asthma and consumption, with fogs, smoke and other pollutants a cause of almost constant suffering. From the late 18th century inhalation became increasingly central as a therapeutic form for such illnesses: Mudge invented the first simple inhaler in 1778; Beddoes and Davy's experiments in Bristol in the 1790s led to the discovery of laughing gas; steam-based inhalers, atomisers and early nebulisers were developed across Britain, France and Germany in the 1800s. For an object-based

history of medicine, inhalation is a particularly notable area of study: here the smallest objects and seemingly simple technologies (pills, medicated steam, inhalation devices) enable powerful and provocative accounts of both the private and sociohistorical dimensions of medicine.

These interests aligned productively with the major redesign of the Museum's medicine galleries for 2019. These new galleries will focus on the ideas, people, technologies and events that have affected human lives over the last 500 years. I enjoyed working alongside the curatorial team surrounding Emily Scott-Dearing and especially Oisín Wall, and with the help of the latter I uncovered and documented one of the 'unloved collections' in Blythe House: the selection of inhalation devices that have not been regarded as suitable for display because of their technical focus or lack of aesthetic appeal. In the course of my research I developed 'biographies' of two of the most common inhalers in the Wellcome Collection housed in Blythe House, the Dr Nelson inhaler and Dr Siegle's steam inhaler, reconstructing the various frameworks of medical expertise and practices from which these emerged and were deployed. I also worked alongside research pharmacists from the University of Hertfordshire and Asthma UK to use modern testing methods on the Nelson inhaler to ascertain its pharmacological and technological efficacy. The findings of these activities will be published in due course.

This raised questions as to the ability of objects in museum collections to 'tell' history on their own terms, and emerging from these discussions we will be organising a workshop on medical objects at the Science Museum in 2017. Alongside these activities I organised a workshop with various stakeholders in the inhalation sector, and I will be co-organising a strand on medical history at the Ashmolean Museum as part of the Being Human festival in November 2016. I have been running a blog documenting these various activities and further information on the project can be found at:

digitaldispensary.org.



Internal Soundscapes: Listening to and Diagnosing the Body in 19th-Century Medicine

MELISSA DICKSON
POSTDOCTORAL RESEARCH ASSISTANT,
DISEASES OF MODERN LIFE:
19TH-CENTURY PERSPECTIVES,
ST ANNE'S COLLEGE, OXFORD

While the use of listening techniques in medical examination is common in contemporary practice, the relationship between abstract bodily sounds and the health or pathology of the body in question are by no means self-evident. It was around 1800 that an empirical turn in medicine, largely inspired by Jean-Nicolas Corvisart, prompted physicians to begin to listen to the sounds emitted by the heart, lungs, blood vessels and intestines in order to diagnose disease. In the early decades of the century, the French physician and amateur musician René Laennec worked to render the body's inner sounds scientifically meaningful as signs of pathological conditions. This involved a long and often painstaking process of carefully matching the sounds he detected during assessments of his patients with the physical changes in diseased organs that could be observed during autopsy. Laennec's ambitious compilation of auditory knowledge was improved in 1816 when, while struggling to examine an obese girl with symptoms of heart disease, he rolled up a piece of cardboard, applied one end to his patient's chest and the other end to his own ear, and thus created the first stethoscope. Elaborating on this concept in the ensuing years, Laennec published in 1819 a 900-page treatise on the art of mediate auscultation, filled with (inescapably subjective) descriptions of the various normal, abnormal and pathological sounds he had detected through use of the stethoscope and the diseases that they signified.

The aim of the two-month investigation in the Science Museum was to explore the new kinds of medical knowledge and ways of listening that became possible through the co-functioning of musical and acoustical experimentation, and to offer insight into the history of technologies of listening in terms of their construction, reception and application, within and beyond the specific social parameters of the medical consultation.

Taking the main example of the stethoscope, but looking also at other listening technologies of the time held within the Science Museum – such as percussion hammers, auscultation tubes, sphygmographs and plethysmographs – the project drew attention to the objects that created, recorded, filtered and received sound in medical spheres, as well as to the bodies and body parts that are represented, connected and disconnected by sound and music in this context. It became apparent that new ways of listening in 19th-century medical diagnosis demanded a cultivated medical ear to distinguish different internal sounds and to 'read' those sounds as physical signs in ways that emphasised the limitations of the unassisted human ear, as well as the new penetrability and vulnerability of the human body, whose inner motions and secrets might now be exposed. Ultimately, these new acoustic medical technologies operated within an auditory culture of medicine that made accessible the internal soundscapes of the human body and functioned as an interface between constructions of presence and absence, and between material and immaterial realms. They were objects of reflection in the broader literary and cultural landscape and an impetus to comedy, poetry and fiction, often as a material testimony to human frailty and the limits of human sensory perception.

The outcomes of the project will be visible via several publications, including an object biography on the ammoniaphone voice enhancer in the spring 2017 issue of the Science Museum Group Journal and a chapter in my current monograph project, tentatively titled *Sounding Out the Body*, which focuses on physiological and psychological responses to sound, noise and music in the 19th century. Proceeds from the grant also funded a one-day interdisciplinary workshop on the nature and methodologies of object-led research in Victorian studies, which brought together researchers and curators who work across the 19th century to address the ways in which researchers 'read' objects, situate such materials within a broader historical context, and construct narratives and arguments based on object-based research.



There is, as Elaine Freedgood has argued in *The Ideas in Things: Fugitive Meaning in the Victorian Novel* (2006), a kind of history that is potentially 'stockpiled' in objects, and throughout this project and its associated workshop, researchers and curators alike demonstrated the range of emotions and individual and cultural knowledge that become available to us through studying particular objects and their intersections with literature. These physical materials can be reflected and refracted across the literary world in new and imaginative ways, offering new readings of literary texts and their relationship with broader culture; however, material culture can also reflect and be shaped by literary forms. And it is these kinds of connections and interconnections that shape the broader cultural consciousness.



In May and June 2016 Melissa Dickson was awarded a Higher Education Innovation Fund Award from the University of Oxford for Internal Soundscapes: Listening to and Diagnosing the Body in 19th-Century Medicine, a project undertaken in the medical collections of the Science Museum.

Invisible Infrastructures: The Unhousing of Science

OLIVER CARPENTER
ASSOCIATE CURATOR OF INFRASTRUCTURE AND BUILT ENVIRONMENT

From September 2015 to June 2016 the Bartlett School of Architecture at University College London and the Science Museum initiated a collaboration looking at the Museum's infrastructure collections (Building Construction, Civil Engineering, Electricity Supply, Gas Industry, Heating, Cooling and Ventilation, Nuclear Energy, and Sewerage and Sanitation). The year-long project, *Invisible Infrastructures: The Unhousing of Science*, involved the technologies and engineering curators from the Science Museum and a group of around 20 second- and third-year undergraduate students from the Bartlett, along with their tutors. I had been in post for just over a month, so this was an excellent opportunity to help me develop my knowledge and understanding of the infrastructure collections now under my care.

The technologies and engineering curators offered to the students and tutors: our time and that of fellow curators and colleagues; access to the infrastructure collections for research – at the Science Museum itself and in our objects stores; the ability to use objects within our collections for their projects; and the opportunity to demonstrate the relevance of integrating history (of technology) and architectural design. In return we hoped they would help us: develop a closer understanding of the Science Museum's infrastructure collections; consider the representation of infrastructure in museums and archives – both within the Science Museum and elsewhere; engage with the ideas of architectural and engineering practice to open up the ways we think about our collections and the history of science and technology; address the challenges of these objects – e.g. they can be models, parts of much larger projects or represent technologies that are hidden; and help us develop a sense of how we might develop and display the collections to new audiences.

We started with a series of introductory tours and talks from others in the curatorial team around the most relevant galleries – namely *Making the Modern World* and *Information Age*. This was followed by group visits to the small/medium-object stores at Blythe House in west London and

the large-object stores at Wroughton in Wiltshire. These visits allowed the students to select an object from our collections, which formed the basis of the main building project for their module. They viewed, measured, photographed and generally got to know their selected object, before spending time researching its history and provenance in our Documentation department.

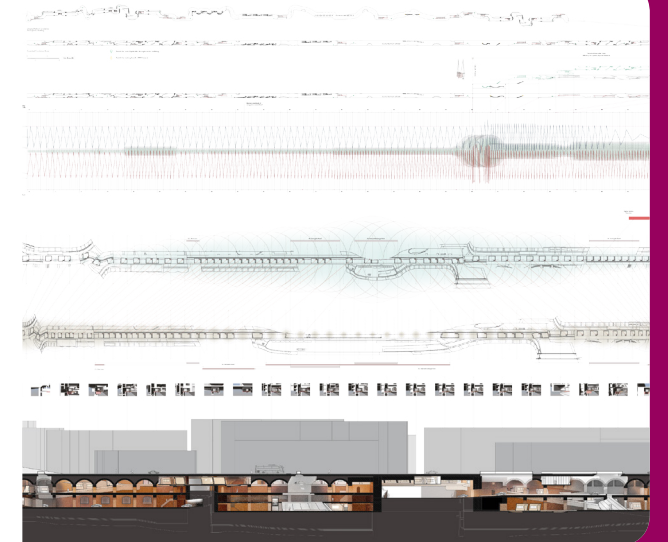
The selected objects were used by the students as the inspiration for an architectural building project that captured and re-imagined the essence of the object and redeployed its story or use for an innovative new structure. Their final portfolio of work was handed in at the end of term in June 2016.

Three examples of student projects are outlined opposite.

The results of this collaboration were mutually beneficial for the Science Museum and the Bartlett School of Architecture. Engaging with wider academic groups outside the history of science or museum studies provided novel demands and challenges for the curators. The new and refreshing insights into our collections led the object research on hitherto unimaginable journeys, proving the value of this interdisciplinary approach. This pilot project with the top architecture school in the country is just the start of a growing research practice, and we have plans to broaden our collaborations with other organisations, both inside and outside academia, in the years to come.

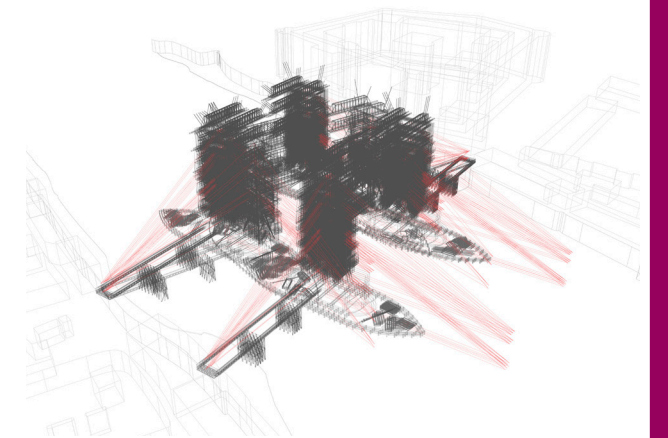
The Housing of Infrastructure, by Kevin Hyun Sik Yoon

As we become increasingly reliant on battery-powered devices this project revisits the case for DC electrical supply via a speculative rewriting of space in the palatial underground conduits of Holborn Viaduct, the trial location of Thomas Edison's nascent DC electrical infrastructure. Following an analysis of Aron's 'clock meter' in which two pendulums measure time and consumption, only to clash if there is a surge in the latter, Kevin developed a notational system for remodelling the viaduct in order to house Tesla and Edison's AC versus DC battle – science at its most quintessentially irrational, proposing a DC underworld in which, via a conveyor belt of traders orbiting an internet exchange for optimised dealing, the AC realm is outwitted and outbid.



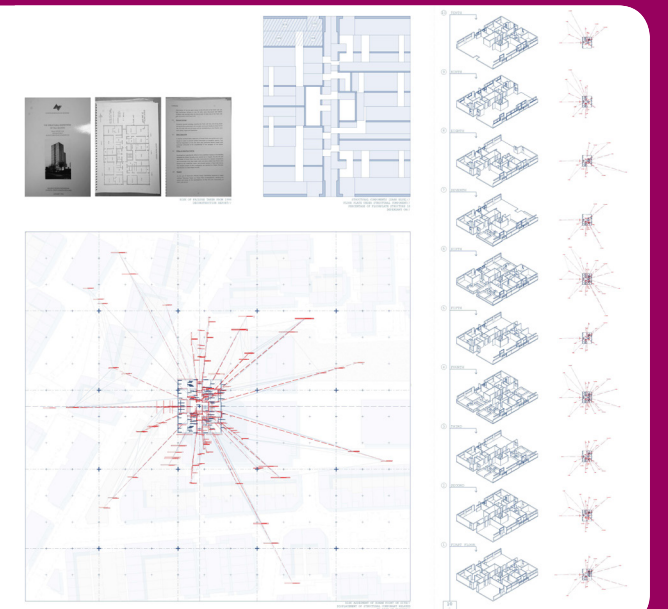
Navigating Indeterminacy: Between the Drawn and the Written, by Olga Karchevska

Hugh of St Victor's written specifications for the construction in the reader's imagination of an imaginary mnemonic Ark that would allow one to store and retrieve information are inherently indeterminate upon drawing. Similarly Sir John Wolfe Barry's compass and sextant, both instruments for drawing lines in space that he used during the construction of Tower Bridge, were subject to indeterminacy: the magnetic field shifted over the five-year construction period and the horizon Barry observed from his barge in the tidal waters was never quite 'true'. Olga's drawings explore the space of latent indeterminacy in both systems of imaginary architectures.



Perpetual Anti-Monument to the Failed Construction Detail, by Lucca Ferrarese

Ronan Point's H2 joint not only brought down half the tower but also the large-panel system industry and 1960s high-rise housing – illustrating the power of the detail, most particularly the failed detail, to rewrite the cityscape. Lucca's analysis of Ronan Point, here remodelled according to the relative failure risk of each H2 joint, led to his proposal for the notorious John Hancock Tower glazing detail. The proposed anti-monument to Boston's 1970 tower is in effect a public space of risk in which the spectacle of erratically falling glazing can be observed as it is endlessly re-harvested, recast and resituated on the façade, only to fail again. The staging of perpetual failure and its denial of completion attempts to interrogate architecture's uneasy relations to failure, not least in its more heroic moments.



Research and Public History at the National Media Museum

MICHAEL TERWEY
HEAD OF COLLECTIONS & EXHIBITIONS, NATIONAL MEDIA MUSEUM

The last year has been one of change at the National Media Museum, as we continue our transformation to becoming a sustainable museum dedicated to the science and culture of image and sound technologies. We have welcomed new members of our curatorial team, initiated a large-scale project to improve access to our archive and library collections, developed new research projects with partners in a number of different universities and continued to support our collaborative doctoral students. We have also been planning for the future of the Museum, with a number of exciting new initiatives due in 2017.

Our first new joiner this year was Dr Annie Jamieson, Associate Curator of Science and Technology. Annie has joined us from Leeds University, where she completed a PhD in the history of medical technologies in 2010 and more recently worked on projects relating to science pedagogy and sound technologies. Later in the year we welcomed Dr Geoff Belknap as Curator of Photography and Photographic Technology. Geoff is a historian of photography, visual culture and Victorian science. He has spent a large part of his career studying and writing about photography, in particular its contribution to scientific communication in the Victorian era and the publication of photographs in 19th-century periodicals. We are thrilled to have them both in the team, and are looking forward to expanding our research activity in areas related to their interests.

This has also been a good year for our cohort of doctoral students, supported through the AHRC CDP and CDA schemes. Ceri Pitches was awarded her PhD from Leeds University after completing her project exploring performance perspectives on the Explainer role at the Science Museum and National Media Museum, and tracing its lineage to 19th-century science lecturing practices. Rebecca Smith this year began her project on the *Daily Herald* Archive entitled *The Daily Herald: Popular Desires and Managing the Production of Photographs*. Rebecca's project is co-supervised by De Montfort University's Professor Emerita

Elizabeth Edwards, who is also a valuable member of the Museum's Advisory Board. Philip Roberts, in the second year of his project looking at magic lantern culture and production in the 19th century, also managed to find time to co-edit a volume of *Early Popular Visual Culture* called *Objects, Archives and Collections*. Philip has also been sharing his expertise with the rest of the curatorial team as we work on our new permanent galleries at the Museum.

We are now looking forward to an equally busy 2017. Next year we will open a major new interactive gallery, *Wonderlab*, which explores the science of light, sound and perception. We will be rebranding and renaming the Museum, launching a new website and continuing our work on new galleries to showcase our collections of photography, film, television and sound technologies.



National Media Museum Curator Emeritus Colin Harding and Professor Emerita Elisabeth Edwards taking part in a panel on researching photography the Dana Research Centre and Library Inaugural Conference.



The newsroom at the Daily Herald, taken in 1947. This year Rebecca Smith began a CDA project on the Daily Herald Archive with De Montfort University. The archive, which constitutes the largely intact picture library of the newspaper, contains over 3 million photographs, negatives, contact sheets and other material.

Research and Public History at the National Railway Museum

ED BARTHOLOMEW
SENIOR CURATOR

In the past year research priorities at the National Railway Museum (NRM) – which are necessarily broad, given the railway's influence on the development of the modern world – have increasingly focused on the Museum's Masterplan. They include the origins of the railway, its continuing impact on people's lives across the globe and the ways in which the railway has been represented by writers, artists and musicians.

Our collaborative doctoral programme includes students at all stages of research. Thomas Spain of the University of York is approaching completion of his Food Miles, a study of the competition between road and rail in transporting foodstuffs, while Hannah Reeves has entered the third year of her investigation of Women and the Railway Family at the University of Keele. The student for the Open University's Home on the Rails research into carriage design has, unfortunately, had to withdraw for personal reasons, but the project has been revived with a new student, the Reverend Amanda Stevens, who joined us in January 2017.

Two new collaborative doctoral students also joined us in 2016. Sophie Vohra's investigation is Railways and Commemoration, a partnership with the University of York's Institute for Public Understanding of the Past, which explores the ways in which the railway industry has been celebrated and commemorated over two centuries. Elizabeth Adams's doctoral research is a partnership with the University of Strathclyde, investigating Literary Cultures, Social Networks and the Victorian Railway Worker.

NRM also sponsored an MA partnership with the University of York's Art History department. Alice McDonald's volunteer contribution included assisting in a conservation survey of the Museum's art collection, while her dissertation explored new aspects of Abraham Solomon's railway paintings and their exhibition at the Royal Academy in 1854.

As this affiliation and our collaborative doctoral research demonstrate, NRM has maintained its close relationship with the University of York, particularly through the Institute of Railway Studies (IRS) partnership. A regular IRS Forum



1979-8075, The First Railway Jubilee in the World, cartoon satirising the commemoration of the fiftieth anniversary of the Stockton & Darlington Railway, 1875



1983-7232, London & Birmingham Railway centenary commemorative medal, 1938



1983-7216, Liverpool & Manchester Railway commemorative medallion, 1830

ensures close ties between Museum staff and academics from a range of disciplines, together with an active seminar programme. Contributors to the seminars have included NRM staff, research students and visiting speakers, and subjects covered have ranged from Southern Railway buses to the evangelical work of the Railway Mission, and from *Flying Scotsman* to work and leisure in a Great Western Railway office in the early 20th century.

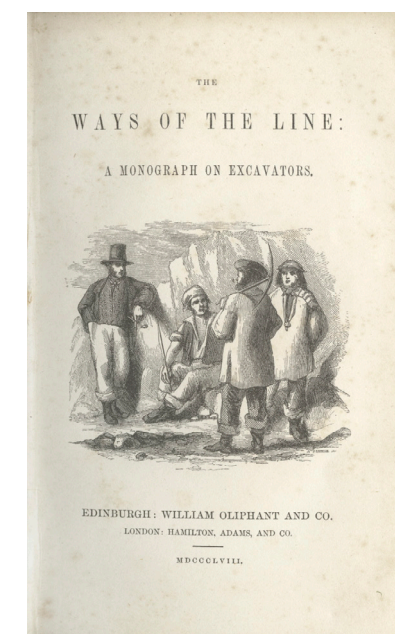
We also strengthened our partnerships with other universities. An award from the Yorkshire Country House Partnership and White Rose Consortium enabled Dr Anna Geurts of the University of Sheffield's Centre for Nineteenth Century Studies to undertake scoping research on travellers' visits to country houses. This micro project now forms the basis of further investigation. We have also worked with the University of Leicester to devise a research strategy for the new Great Central Railway–NRM Mainline Museum in Leicester, which is supported by the Heritage Lottery Fund.

Our annual conference in September 2016 was titled Railways and Warfare, which included speakers on ambulance trains, the Berlin to Baghdad Railway and railways during the Irish Civil War. NRM also sponsored the York Transport Historians Group's one-day workshop Making the Connections, bringing together scholars from various disciplines to discuss transport's pivotal contributions to history. Topics ranged from controversies surrounding the development and operation of Concorde to travel to the Great Exhibition in 1851. NRM staff and collaborative students also contributed to conferences and seminars nationally and internationally.

Our future plans include deeper research on a wide range of themes for the NRM Masterplan, including the museology that will enhance our interpretation and understanding of audiences. We will extend our collaborations with academic institutions nationally and internationally, while a conference on British Rail's modernisation in the 1960s is already being planned for 2018.



1983-7247, reverse of the George Stephenson medal of the Institute of Mechanical Engineers



Title page from *Ways of the Line, A monograph on excavators* by Ann Tregelles, 1858



Frontispiece from *Ways of the Line, A monograph on excavators* by Ann Tregelles, 1858



1983-7268, Stockton & Darlington Railway commemorative medal, 1925

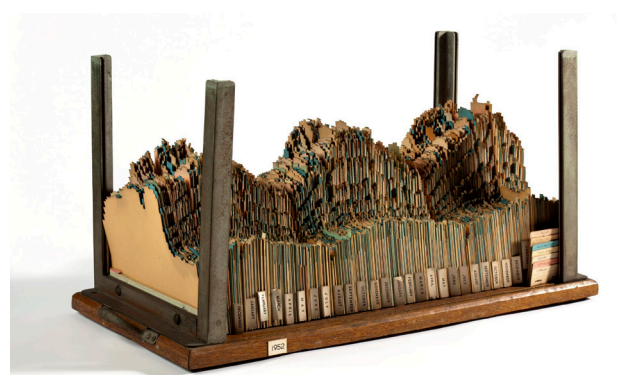
Research and Public History at the Museum of Science and Industry

GEORGINA YOUNG
HEAD CURATOR

The Museum of Science and Industry (MSI) has built its own research culture and broadened awareness and usage of the collections for research during 2015/16. Key strands of activity have centred on the intellectual development of the forthcoming exhibition *Electricity: The Spark of Life* and on exploring new ways of working with our local academic and student communities, particularly by providing briefs, challenges and inspiration for innovative, cross-disciplinary projects.

Content development for *Electricity: The Spark of Life* has been a powerful driver for research activity at MSI. Central to this was an electricity study day hosted at the Museum in November 2015. The event brought together academics working on electricity across a range of disciplines with the team developing content for the exhibition from the MSI, Teylers Museum and the Wellcome Collection. The complementary Material Cultures of Energy research project (detailed elsewhere) has also enhanced our knowledge and networks in relation to the exhibition. Collaborative doctoral award student Paul Coleman's ongoing work on the development of megavolt electricity with the University of Leeds has simultaneously brought new insights into our substantial and nationally significant electricity collections.

The growth in collaborative doctoral research noted in 2014/15 has continued and it has become an embedded and essential part of MSI's research culture. This year Josh Butt joined the Museum, studying the rise and fall of the Manchester motor industry with Manchester Metropolitan University. Josh's research draws on a range of archive material held at MSI such as the records of the coach-building firm Joseph Cockshoot & Co. His public research blog forms a record of revelations arising from his first year's work. Erin Beeston's study of the former lives of the buildings that now make up MSI with the University of Manchester entered its final phase and has had a clear influence on the way the whole Museum thinks about, values and plans for the future of its historic site. MSI has also looked closely at its connections with local academic and student communities, made new links and tried new things. In 2015/16 we took time to assess our existing relationships and found out more about the needs of our academic



Three-dimensional chart of electricity generation / demand. Mid 20thc. Object selected for *Electricity: The Spark of Life*.

partners through activities such as an archives open afternoon for Manchester Metropolitan University colleagues. MSI participated in the University of Manchester's REALab scheme, which asked partners to set challenges for postgraduate researchers, and hosted Manchester School of Art's Unit X interdisciplinary module within which students have the opportunity to work on live briefs in a real-world environment. More broadly – following consultation with academics from universities across Greater Manchester – MSI altered the structure and content of its offer for student groups, allowing more flexibility in time slots and developing introductory sessions to the Archive and Object collections. This has already delivered benefits, both increasing group use of the Collections Centre at MSI fourfold in comparison with the average in previous years, and lifting awareness of the range and quality of our collections among a broad-based cohort of students.

All the while, building capacity and confidence for research within the Museum has been an underlying intent. Activity in this area during the 2015/16 academic year has included curators and archivists attending training delivered by the Research and Public History team and the North West Doctoral Training Partnership, expanding our pool of PhD supervisors to include archivist Jan Shearsmith, and co-developing and hosting a range of events, from a Cottonopolis to Metropolis workshop for University of Manchester history MA students, to a session for postgraduate researchers with Manchester School of Art titled *The Writing Object*.



Sebastian Ziani de Ferranti aged 16, from MSI's Ferranti Archive.

Learning research projects and audience research: getting the research into the hands of practitioners

KAREN DAVIES
HEAD OF LEARNING RESEARCH AND RESOURCES

JANE RAYNER
AUDIENCE RESEARCH MANAGER

The Science Museum Group Learning Strategy 2016–2020 outlines the ambition to establish the Science Museum Group (SMG) as a must-visit destination for igniting curiosity in science – a space where engaging with science is enjoyable, interesting and inspiring across all platforms and for all audiences. In order to achieve that ambition we use up-to-date research and evaluation that helps us better understand audiences' needs, wants and expectations, to guide the development of new exhibitions, web resources and events, so that users make the most of our Museums both on site and online.

As part of this we are using longitudinal academic studies, one example being the Enterprising Science project in partnership with King's College London (KCL) and supported by BP. This project is developing the concept of 'science capital', a ground-breaking explanation of how and why young people do or do not engage with science, which in simple terms is more likely if they have high science capital. Other examples of academic study include the Building Bridges project in partnership with University College London (UCL) and supported by Shell (providing links – 'bridges' – between the science learnt at school, the science encountered at the Science Museum and science as part of everyday family activities), as well as internal practice-based research to inform our work.

In 2017 the Audience Research and Advocacy team will be working with academic researchers from UCL to draw together and review the evidence we have been collecting through 10 years of evaluation about how visitors engage with science objects, and setting it in the context of current

academic research on museum object meanings and engagement. This research will enable us to better understand how our visitors engage with our collections, as well as highlight some of the gaps in the Museum's knowledge and raise potential questions for future research.

Through the Enterprising Science project, SMG is playing an integral role alongside KCL in the development of the science capital concept and how science centres and other informal science learning environments can best utilise their collections, interactive experiences and/or contemporary science offer to build levels of science capital in all young people. The science capital concept is now central to SMG's strategic ambitions for 2017–30, where the number-one core priority is 'to grow science capital in individuals and societies' by using 'the principles of science capital to describe and shape our learning content and programme across all our sites'.

There are eight dimensions, defined by the KCL research through questionnaires and statistical analysis, that shape people's science capital and their relationship with science: (1) science literacy; (2) science-related attitudes, values and dispositions; (3) knowledge about the transferability of science (the idea that science 'opens doors' to many careers); (4) science media consumption; (5) participation in out-of-school science learning contexts; (6) family science skills, knowledge and qualifications; (7) knowing people in science-related roles; and (8) talking about science in everyday life. It is crucial we reflect on these dimensions and develop practical methods that address them when



shaping our learning content and programmes, as well as valuing the varied experiences and types of capital that our diverse audiences bring. It is not simply a science capital check list, it is a new way of thinking and working.

For people with medium and low science capital, who do not have the confidence to use our Museums, research shows that helping them to recognise they have science skills can help build their science identity. Also, helping people make a personal connection with science, so that they are able to link their cultural experiences and personal interests to science, and helping them see the relevance of science in their everyday lives, can have an impact on their attitude to science. We must ensure that visitors feel valued, have a voice and see 'people like them' represented in our exhibitions and working in our institutions. Because museums and science centres are only part of a wider 'learning ecology', and people 'bump into science' throughout their lives, building a person's science capital requires a joined-up approach. This should involve collaborative work with schools and other providers, ideally reaching every environment a person might inhabit.

The Museum project team are translating science capital research into practice by developing tools and approaches to (for example) audit and reflect on our current offer, shape the development and delivery of new and existing experiences, review and redefine what success looks like, and identify examples of good practice across the sector (see our Transforming Practice blog at transformingpractice.wordpress.com). We are also running science capital workshops for staff across the Group, which cover the relationship between science capital and science engagement; how to embed the science capital dimensions through reflective practice; and how to write learning outcomes through a 'science capital lens', to support the adoption of this new way of thinking across Museum teams and more widely.

In terms of audience, we know from Enterprising Science research that there are many challenges in supporting families who are (for example) under-represented in museums (see L Archer et al., 'Disorientating, fun or meaningful? Disadvantaged families' experiences of a science museum visit', *Cultural Studies of Science Education*, 11/4 (2016), pp917–39). The Building Bridges research (2015–17) aims to contribute to a broader understanding of under-represented and 'absent' families within museums, as well as examining the specific aims of the Building Bridges project and providing recommendations for the ongoing project and future projects at the Science Museum and elsewhere. The research questions include: 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? And what is the impact of families' involvement in the Building Bridges project on their views, conversations and activities related to science?

The research considers the resources, interests and aspirations these families have that may not be explicitly related to science, but which nonetheless may be important for 'science engagement'. The research is based on an in-depth quantitative approach and includes case study families, focus groups, interviews and observations. Findings so far indicate the importance of links between families' interests, their local communities and museum content. Families in this study draw on many networks in their everyday lives, and when aiming to engage this audience we understand it is important to consider these networks rather than simply viewing these families as insular. This is ongoing work.

Material Cultures of Energy: Transition, Disruption and Everyday Life in the 20th Century

HIROKI SHIN
CO-INVESTIGATOR, MATERIAL CULTURES OF ENERGY:
TRANSITION, DISRUPTION AND EVERYDAY LIFE IN THE 20TH CENTURY

The Science Museum Group's (SMG's) collaboration with the AHRC-funded project Material Cultures of Energy: Transition, Disruption and Everyday Life in the 20th Century (MCE) continued in 2015–16. Tim Boon serves on the project's advisory board and has contributed his expertise to the project's general direction in research and engagement activities, and in particular to a planned workshop on energy and film. Frank Trentmann (Principal Investigator) and Hiroki Shin (Co-Investigator) participated in the Science Museum's Dana Research Centre and Library Inaugural Conference on 31 March – 2 April 2016. Their paper, 'Material cultures of energy', unpacked the hidden dimensions of domestic energy demand and highlighted energy users' day-to-day experiences. The presentation discussed the role of materiality, the creation of different visions of energy future and the temporal politics during energy disruptions. It showed how energy has been embodied and acted out in everyday practices, and that the variations in the material experience of energy across and within places and classes need to be incorporated in our understanding of energy transitions.

How to approach, analyse and communicate the material sides of energy was at the heart of the workshop Material Practices of Energy Consumption: Use and Abuse of Energy in the Past, jointly organised by the Science Museum and the MCE project in September 2016. This meeting examined the role of materiality in domestic energy use in private and public settings, including how energy's materiality has and is being represented in museum exhibitions. Presentations at the workshop ranged from heat and light to cookers and meters. By bringing together curators from the museum sector and academics working on material culture and consumption, the workshop aimed to facilitate greater awareness of research and methodology concerning energy and its public understanding. The meeting was attended by Robert Bud, Helen Peavitt and Stuart Butler from the Science Museum, and Alice Cliff from the Museum of Science and Industry (MSI).

SMG has also assisted the MCE project's public engagement activities. In March 2016, 30 students from Saijo High School, Japan, visited MSI in Manchester and the Science Museum in London, and participated in lecture and study sessions organised by MCE researchers. At MSI the students learned how electricity and gas have been marketed by utilities and appliance manufacturers, using advertising materials from MSI's archive. The students also explored energy-related exhibits in the Science Museum to think about how people's daily practices and time use was linked to specific appliances.

The collaboration between SMG and the MCE project is not only stimulating museum curators and university academics, but also inspiring young people from abroad.

Peeress gas cooker on display in the gas gallery (now closed) at MSI Manchester

The Traffic Problem: Geographies, Politics and Technologies of Congestion in 20th-Century London

DAVID ROONEY
KEEPER OF TECHNOLOGIES AND ENGINEERING

London's *Evening Standard* on Friday 9 December 2016 carried an apocalyptic front-page headline: 'LONDON TRAFFIC GRINDS TO A HALT'. The article described 'gridlock blighting central London's roads', claiming that average traffic speeds were 'just 7.8mph' and that traffic was 'as slow as a horse and cart'. But such claims are nothing new. We have been told for decades – with some justification – that London traffic goes no faster than a horse. In 2010 I embarked on a six-year doctoral research project at Royal Holloway's geography department to examine traffic congestion in 20th-century London.

In this project, supervised by David Gilbert and advised by Peter Adey, I explored ways in which ideas about movement, mobility and circulation in the capital's streets have intersected with a broad range of discourses and practices, from planning to policing, and from engineering to economics. Within these discourses, I argued, characterisations of congestion could be seen as political acts, and the solutions of the problem therefore represented political as well as geographical and technological world views.

My thesis opened with an examination of the experience of congestion in 20th-century London, setting up the so-called 'traffic problem', before surveying the ways traffic congestion has been considered in the history of urban planning, the dominant discourse in which this topic is explored. Common themes emerged from this close reading of the planning literature, including geographies of governance and the relationship between London-wide bodies and local authorities; technologies of congestion and notions of grids, surveillance, verticality and technological progress; segregation and control of different classes of people and vehicles; and the politics and financing of roads and mobility.

Then, I examined 'solutions' of the traffic problem from a set of disciplinary points of view suggested by these themes, namely police officers, highway engineers, systems analysts and political economists (although the boundaries between the

groups are highly permeable). In each instance, detailed case studies of geographical places and technological structures were used to ground the discussions of disciplinary discourses and point to their limits. I then returned to the professional planning discourse to draw together these themes, examining how plans to reduce congestion in London have been negotiated into reality.

I concluded by looking at the situation in London today and in the near future. This included accounts from current practitioners in each of the disciplinary fields studied, and gave a sense of the long-term continuity of these wider concerns – the fact that characterisations of congestion are themselves historical artefacts which travel through time.

In 1964 the architectural critic Reyner Banham narrated the commentary for a BBC film on the planning of London. Over scenes of crowded streets, he observed that 'For most of this century, planners and visionaries have denounced London as congested, inhuman, restless, wasteful. But the margin between fullness and congestion is very slight. Often it is only in the eye of the beholder. London can be like a party where there are just a couple of guests too many ... But most of the time ... a party that really swings.' My thesis attempted to deconstruct the traffic problem, treating traffic as a socio-technical network of actors, both human and non-human, situated in sociological and political contexts with histories. To do this, I decentred the canonical plans and planners of London, allowing an exploration of the margins. This meant examining conceptualisations, rather than measurements, of congestion, recognising that it must be seen as more than a case of speed, volume and flow.

It might have been possible to conclude from this that we will never be able to understand the traffic problem as it is just too slippery in our hands. What is seen as a problem from different perspectives seems soluble, but when we fragment things and look at it from the different perspectives considered



'The Traffic Problem', County of London Plan, 1943–45.

in my thesis, it becomes so multidimensional that it resembles a kaleidoscope, an ever-changing resolution, interesting in each configuration but never stable. However, I did draw a series of wider conclusions from the patterns, even as they shift and reform in our hands.

Firstly, I demonstrated that we can only understand the traffic problem by looking across time, space, disciplines and professions. It is easy to take the traffic problem at face value, seeing it in turns as a chronic pathology of free movement and a looming acute crisis requiring drastic action. A survey of the characterisations of traffic congestion in London's urban planning literature found a great deal of consistency in the ways it has been represented and in the solutions put forward – circulation, flow, ring roads, segregation, arterial routes and so on. The traffic problem was a failure of planning. But, as Reyner Banham claimed in his comments quoted above, most of the time London really swings. I showed that the vast diversity of experiences of the capital's streets cannot be reduced to a singular, universal problem which only reconstruction can solve. The dominance of professional planning in 20th-century discourses of traffic and movement in cities has marginalised wider views and alternative conceptualisations but we can only understand traffic by seeking and exploring them.

Secondly, I drew together ideas about the relationships between traffic, capital, markets and the state. I proposed that traffic and road infrastructure has a distinct relationship with capitalism, and that London's traffic landscape has a longer history of marketisation than is commonly proposed, whether in an overtly neoliberal road-pricing project or in the saturation with market decisions of a wide variety of traffic projects realised from the 1950s onwards. I therefore proposed that thinking of traffic as a flat network need not imply that all actors have equal power – capital acts as an ineluctable gravitational pull on all decisions about traffic. However it is not the only form of social relation to do so and I considered other ones.

Finally, I considered how much of what I explored is particular to London and how much could apply elsewhere. I argued that London's physical and historical geometry renders its traffic unique, but with powerful connections to other places which might give my limited, London-centred account some value as a model for thinking about complex urban infrastructures and their problems more generally. My thesis was examined in May 2016 by the urban historians Michael Hebbert and Simon Gunn and I was awarded my doctorate with no amendments required.

Mid-Century Molecular: The Material Culture of X-ray Crystallographic Visualisation

A recently completed thesis

EMILY CANDELA

The Royal College of Art and the Science Museum are hosting the AHRC collaborative doctoral research project Mid-Century Molecular: The Material Culture of X-ray Crystallographic Visualisation Across Post-War British Science and Industrial Design. This interdisciplinary project is an exploration of cross-field exchange between X-ray crystallography and design in the period, the ways in which this exchange has been remembered in contemporary popular culture and historiography, and of how researchers might approach the histories of interdisciplinary networks and communication.

The research focuses on objects from three areas in which 'science' and 'design' – as fields, cultures of practice and historical subjects – interact in different ways: X-ray crystallographers' material practices of visualising molecular structures; the Festival Pattern Group scheme for the 1951 Festival of Britain, in which crystallographic visualisations formed the aesthetic basis of patterns for domestic objects; and post-war furnishings with a 'ball and rod' form and construction reminiscent of those of molecular models, explored in the context of the period of their initial production as well as their lives in contemporary 'retro' culture.

A key component of the project is methodological. The research brings together subjects, themes and questions traditionally covered separately by two disciplines: the history of design and history of science. This focus necessitated developing an interdisciplinary set of methods, which results in the reassessment of disciplinary borders and productive cross-disciplinary methodological applications. This thesis also identifies new territory for shared methods: it employs network models to examine cross-disciplinary interaction between practitioners in crystallography and design, and a biographical approach to designed objects that over time became mediators of historical narratives about science. Artefact-based, archival and oral interviewing methods illuminate the production, use and circulation of the objects examined in this research.

This interdisciplinary approach underpins the generation of new historical narratives in the thesis. It revises existing histories of the cultural transmissions between X-ray crystallography and the production and reception of designed objects in post-war Britain. I argue that these transmissions were more complex than has been acknowledged by historians: they were contingent upon post-war scientific and design practices, material conditions in post-war Britain and the dynamics of historical memory, both scholarly and popular.

This thesis responds to the need for practical research on methods for studying cross-disciplinary interactions and their histories. It reveals the effects of submitting historical subjects that are situated on disciplinary boundaries to interdisciplinary interpretation. Old models, such as that of unidirectional 'influence', subside and the resulting picture is a refracted one: this study demonstrates that the material form and meaning of crystallographic visualisations, within scientific practice and across their use and echoes in designed objects, are multiple and contingent.



Models from MRC Laboratory of Molecular Biology

Cartographic invisibility in Zambia

ELIZABETH HAINES
COLLABORATIVE DOCTORAL STUDENT

This year I concluded the research and writing of my doctoral thesis, funded by the AHRC and conducted at the Science Museum, as well as Royal Holloway, University of London, as a collaborative doctoral award. The project began as an exploration of the use of aerial photography in mapping colonial territories in Africa, but as I began the research the project expanded to become a study of how maps of all kinds were commissioned, surveyed, printed and used by British colonial organisations in the early 20th century. It also narrowed, geographically, to focus on Zambia.

Through support from the AHRC and a travel grant from Royal Holloway, I had the opportunity to carry out research in archives and collections with very different sets of papers and objects. Some of these were governmental archives, including those of the UK and the National Archives of Zambia in Lusaka. I also worked with the archival records of private industry. The research took me to the papers of mining magnates who were based in the UK (held in the London School of Economics Special Collections and at the John Rylands Library, University of Manchester). I also visited the archival repository of mining companies in the Copper Belt, Zambia (Zambia Consolidated Copper Mining Archives), and the record office of an aerial photographic company in Johannesburg. Finally, I sought out individuals – former colonial officers, aerial photographic pilots and surveyors – and was lucky enough to be able to see examples from their personal collections of papers, maps, photographs and objects. All these provided new contextual understanding of the Surveying collection in the Science Museum.

My archival research testified to the continued use of very basic survey tools long after they apparently became outmoded as a result of new technologies. In British colonial Africa the availability of survey equipment varied widely between different organisations (and even different geographical regions). Mapping in sub-Saharan Africa was not comprehensive; funds were directed to areas where large-scale development projects indicated future economic value. Thus, in the 1950s, new radar technology was being tested as a means to organise aerial photographic work in some areas of southern central Africa, and new computing machines were enrolled at the National Physical Laboratory to calculate the distribution

of error in land measurement. At the same time a local administrative officer in Northern Rhodesia was trying to make a map of the area under his jurisdiction – 12,000 square miles – using a cyclometer and a compass.

In addition to considering how maps were produced, I became fascinated by the tactics that colonial government officers adopted in rural areas in order to cope with their duties in the absence of reliable large-scale cartography. These tactics included heroic efforts to construct ad-hoc replacement maps, such as the case of the administrative officer mentioned above. However, more often it meant a heavy reliance on the colonised African population. Often (and right up until independence in 1964) officers depended entirely on local guides to navigate between villages, identify earlier survey markers or even just to distinguish one river from another. In some areas basic geographic knowledge was never committed to paper and was made and made again in the negotiations between colonial officers and local people.

Writing the thesis highlighted the extent to which this lack of systematic geographical knowledge of rural Africa continues today, despite a generally conceived idea that the world has been fully mapped. Satellite visualisations offer great potential, but unless the images are linked to place names, demographics, historical data about land use or other geographical information they have limited applications in social life. Travellers, ecologists, surveyors, agricultural experts and politicians carry out everyday activities, and plan for the future without a cartographic record to document, share or explain their work. They continue to need to find heroic ad-hoc solutions, and to rely on local memory and assistance. In partnership with the Arts & Culture Unit (theartsandcultureunit.com), and in collaboration with Adam Caulton, I extended my research and carried out a series of interviews to explore how the scarcity of mapping – or as we coined it 'cartographic invisibility' – shaped past, present and future in Western Province, Zambia. We edited these interviews into a three-part radio programme Time Lines, which was broadcast as part of the series *Modulations on Resonance FM* in July 2015 (theartsandcultureunit.com/portfolio/time-lines).

Opportunities to study and research with us

TIM BOON
HEAD OF RESEARCH AND PUBLIC HISTORY

The Dana Research Centre and Library is host to a wide range of researchers, 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. We start with postgraduate students: in the 2015/16 academic year, for the third time we taught 'curating the history of science', a 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 rockets to iron lungs and phonographs, and 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.

We also welcome doctoral students to undertake projects with us. 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 British Telecom Archives – currently awards six studentships per annum. Every summer we publish a document outlining the subject areas in which we are most interested, and invite colleagues in the museums and universities to work together to propose projects that address those areas for a closing date in 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, SMG also welcomes students funded under other schemes, and indeed by other funders, to work in our Research Centre and on our collections.

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. Several of the articles in this report reflect work undertaken by associates and fellows who have worked with us.

For all our research collaborations, we stress that at any given time the SMG museums 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, sciencemuseum.org.uk/about-us/collections-and-research, or e-mail us at research@sciencemuseum.ac.uk.

Science Museum Library and Archives: research opportunities

NICK WYATT
HEAD OF LIBRARY AND ARCHIVES

The Science Museum Library and Archives collections offer significant opportunities for future research and exploitation. Occupying over 25 kilometres of shelving at the Science Museum's Wroughton facility, the collections are a world-class resource covering the worldwide development of science, technology, industry, medicine and related subjects over the past 500 years.

We welcome proposals for new research, whether it is in existing collections or recent acquisitions. Previous scholars and collaborative doctoral partnership students have exploited just a very small proportion of these collections and include Noeme Santana's revealing analysis of photographs from the Pearson Archive, discussed in last year's annual report. Currently there are researchers worldwide using the collections to investigate a wide range of subjects, from evidence of ownership and use in early mathematical books or the notations made in Charles Babbage's manuscript drawings, to the development of genetically modified foods or John William Dunne's psychological and aeronautical research.

In many subjects the library and archives hold a critical mass of material, offering useful insights and new documentary evidence. The launch of the archives' web catalogue in 2016 has helped in the identification of this material. The archive collections have recently been the largest growth area for the Science Museum. Researchers can contribute to the documentation of these collections by listing their contents as they survey the material. Larger collections received this year have included the Porton Down Archive of Chemical Warfare, which is particularly detailed on research into, and protection from, the effects of chemical weapons on people and the environment. Other collections include John Evershed's archive, which has interesting material relating to his astronomical work in India, and the archive of the Williamson Kinematograph Company Ltd and its successor, the Williamson Manufacturing Company Ltd which developed aerial reconnaissance cameras.

Future research may also look across individual archive collections, picking out examples that contribute to a wider theme, such as the role



of celebration within companies or societies; the archives have many examples of dinner menus – some signed – to mark anniversaries, honours or other events. This theme has not been investigated methodically and very little has been written about it. Such a project could also draw upon archive collections elsewhere within the Science Museum Group.

The library collections are extensive and selecting themes for research is challenging. The Trade Literature collection, largely unexploited and one of the largest such collections in Britain, offers significant potential. Containing mainly British manufacturers' and distributors' catalogues, advertisements and owners' manuals, it covers a wide range of subjects including catalogues for bicycles, radios, domestic appliances, sanitary ware, and scientific and medical equipment. There are many avenues to be explored, including the history of companies, product design, distribution and advertising, or the language of technical

manuals. The library uses volunteers to help list this collection and over 16,000 items have been listed so far – information that can help researchers narrow down their requirements. Many of these catalogues document objects that are now in the Museum’s collection, allowing the researcher to compare the printed description and illustration to the product itself.

Another area of potential interest is the Exhibition Literature collection, which contains 1278 publications from national and international exhibitions (also known as World’s Fairs), including exhibition catalogues, listing all objects displayed and sometimes published in several languages; guidebooks, colourfully written, often published in many different editions; commemorative publications, including souvenir albums of views; surveys of industries in participating countries; general, financial and jury reports published by the organisers; and official government reports by participating national governments. International exhibitions have received greater interest in recent years, but this has been directed at the larger exhibitions rather than the smaller ones such as those held in South Kensington in the 1880s.

Researchers now benefit from access to library and archive material in the splendid Dana Research Centre and Library in London. Here they can consult selected items transported from Wroughton in a relaxing and inspiring environment. Digital copies of original material can be produced for consultation or purchase, including large-format engineering drawings. Visitors can browse around 6000 open-access books and recent journals on the history and biography of science, technology and medicine, or use the Science Museum’s electronic resources, including all of JSTOR, the *Dictionary of Scientific Biography* and the *Illustrated London News* Historical Archives, 1842–2003. They can also use the library’s digital microfilm reader – the library has Britain’s only microfilm copy of the Archive for the History of Quantum Physics. Those wanting to examine large quantities of material should book a visit to the Wroughton library.



Publications and Presentations

(October 2015 - September 2016)

Publications

- Baird, Iain.** ‘Capturing the Song of the Nightingale’. *SMG Journal*, no. 4 (19 October 2015).
- Bennett, Jim.** ‘Telescopes in “A Companion to the History of Science”’. Edited by Bernard Lightman. *Wiley Blackwell*, May 2016, 530–42.
- ‘The Science Museum and the Leonardo Da Vinci Quincentenary Exhibition of 1952’. *Science Museum Group E-Journal*, no. Issue 4 (Autumn 2015).
- Blatchford, Ian.** ‘Symbolism and Discovery: Eclipses in Art’. *Phil. Trans. R. Soc. A*, 22 August 2016. doi:10.1098/rsta.2015.0211.
- Blyth, Tilly.** ‘Exhibiting Information: Developing the Information Age Gallery at the Science Museum’. *Information & Culture* Vol.51, No.1 (2016): 1–28.
- ed. ‘Information Age Special Edition’. *Information & Culture: A Journal of History* Volume 51, no. 1 (January 2016).
- Boon, Tim.** ‘To Formulate a Plan for Better Living’: Visual Communication and Scientific Planning in Paul Rotha’s Documentary Films, 1935-1945’. Edited by Harmke Kamminga and Geert Somsen. *Pursuing the Unity of Science: Ideology and Scientific Practice from the Great War to the Cold War*, 27 May 2016, 156–81.
- Boyle, Alison.** ‘Book Review: Maskelyne: Astronomer Royal, Rebekah Higgitt (Ed).’ *Journal for Maritime Research* 17, no. 2 (25 November 2015): 225–26.
- “Collecting and Interpreting Contemporary Science, Technology and Medicine at the Science Museum” in *Patrimoine Contemporain Des Sciences et Techniques*. Edited by Catherine Ballé, Serge Chambaud, Catherine Cuenca, Robert Halleux, and Daniel Thoulouze. *La Documentation Française*, April 2016, 353–62.
- Bradford, Jessica.** ‘New Approaches to Displaying Mathematics at the Science Museum’. *Informal Learning Review*, no. September October issue 134 (1 October 2015): 9–12.
- Bud, Robert.** ‘Representing Scale: What Should Be Special about the Heritage of Mass Science?’ *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, no. 55 (February 2016): 117–19.
- ‘Resisting Antibiotics: The Social Challenges of Drug Reform’. *Boston Review*, 27 October 2015.
- Burden, Louisa, Jannicke Langfeldt, Ben Regel, and Mary Ryan.** ‘Doping at the Science Museum: The Conservation Challenge of Doped Fabric Aircraft in the Flight Gallery’. *Science Museum Group Journal* Autumn 2016, no. Issue 06 (Autumn 2016).
- Greg, Hobson, and Russell Roberts.** *William Henry Fox Talbot. Dawn of the Photograph*. Scala Arts & Heritage Publishers Ltd, 2016.
- Haines, Elizabeth.** ‘Review: The Technical Image: A History of Styles in Scientific Imagery, Eds. Horst Bredekamp, Vera Dünkel, Birgit Schneider.’ *British Journal for the History of Science* 49, no. 1 (March 2016).
- ‘Technologies, Risks, and Rewards: Cartography and Capital in Northern Rhodesia, 1924-1949’. *Environment and Planning A* 48, no. 4 (April 2016): 648–64.
- Highfield, Roger, Peter V. Coveney, and Edward R. Dougherty.** ‘Big Data Need Big Theory Too’. *Special Edition of Phil Trans*

Royal Soc A Volume 374, no. issue 2080 (3 October 2016).

- Lee, Ling.** ‘Cravings: Making Obesity Palatable for a Young Audience’. *Informal Learning Review*, no. Issue 134 (October 2015): 4–8.
- McLean, Andrew.** ‘Flying Scotsman: Modernity, Nostalgia and Britain’s ‘cult of the Past’. *Science Museum Group Journal* 5 (Spring 2016).
- ‘The Flying Scotsman: Speed, Style, Service’. *Scala Arts & Heritage Publishers Ltd*, 2016.
- Millard, Doug.** ‘Cosmonauts: Birth of an Exhibition’. *Science Museum Group E-Journal*, no. 05 (Spring 2016).
- Nahum, Andrew.** ‘Dr Alex Moulton’. In *The Oxford Dictionary of National Biography*, 2016.
- Roberts, Phillip.** ‘A Geology of Media (Review)’. In *Early Popular Visual Culture*, 117–19, 2016.
- Optical Pantomimes at the Royal Polytechnic Institution: George Buckland’s 1875 Production of Gabriel Grub and the Grim Goblin*, 2016.
- ‘The Early Life of Philip Carpenter’. In *The Magic Lantern*, 10–13, 2016.
- Robertson, Haileigh.** ‘Reworking Seventeenth-Century Saltpetre’. *Ambix* 63 (24 August 2016): 145–61.
- Rooney, David.** “Quartz Clocks and the Public in Britain, 1930–60”. *Antiquarian Horology* 37, no. 2 (June 2016): 237–46.
- Stewart, Louise.** ‘Needing Treatment: A WWI Surgical Field Pannier’. *Icon News*, no. 61 (November 2015).

Presentations

- Almond, Gemma.** ‘The History of Spectacles in Its Place: A Material, Medical or Disability History?’ 8 July 2016.
- Ariaratnam, Georgeenia, and Sheldon Paquin.** ‘Let’s Talk About Text: How to Write Effective Labels’. presented at the Let’s Talk About Text: How to Write Effective Labels (Museum Association), Royal College of Surgeons, London, 9 December 2015.
- Bartholomew, Ed.** ‘Flying Scotsman: Marketing, Advertising and Publicity’. presented at the Institute of Railway Studies, University of York, 10 March 2016.
- ‘Take Me by the Flying Scotsman’. presented at the Centre for Evolution of Global Business and Institutions, University of York, 16 September 2016.
- Beeston, Erin.** ‘History, Heritage and Re-Presenting Liverpool Road Station’. Faculty of Life Sciences Research Symposium (UoM), 25 September 2015.
- ‘Oldest Railway Station in the World’: Liverpool Road Station and the Museum of Science and Industry in the Mancunian Imagination’. Landmarks 2015: Heritage and History Conference, 15 October 2015.
- ‘Summary of “Spaces of Industrial Heritage: A History of Uses, Perceptions and Remaking of the Liverpool Road Station Site, Manchester” PhD Chapters 3-4’. presented at the MSI Seminar, MSI, 27 May 2016.
- Bennett, Jim.** ‘Can a “museological” Perspective Contribute to an Account of Artisanal Culture in Early-Modern Mathematics?’ presented at the Artisanal Knowledge: Material and Epistemic Cultures in History of Science, University of Lisbon Lisbon, Portugal, 29 April 2016.

‘Early Methods of Finding Longitude by Lunar Distance at Sea: What Was Really Involved?’ 5 February 2016.

‘How Leonardo Came to London in 1952’. presented at the Leonardo Lecture Programme, Science Museum, 12 April 2016.

‘Is There a ‘Museological’ Approach to Research in Early-Modern Science and Technology?’ presented at the Deutsches Museum, Seminar, Deutsches Museum, Munich, 9 May 2016.

‘On Being Brief in the History of Mathematics’. presented at the Queen’s College, Oxford, Mathematics Forum, 30 May 2016.

‘Real Instruments and Image Making in the Early Royal Society’. presented at the SMG Research Conference 2016, Science Museum Dana Research Centre and Library, 2 April 2016.

‘Thomas Romney Robinson: Science and Public Life in Nineteenth-Century Ireland’. Belfast Natural History and Philosophical Society, 16 September 2015.

Bennett, Jim, and Sylvia Sumira. ‘Were Globes Used in the Practice of Early-Modern Astrology?’ Scientific Instrument Commission, Turin, 8 September 2015.

Betts, Oliver. ‘A Permanent Place in the Landscape: The Architecture and Experience of Railways’. presented at the Architecture and Experience in the Nineteenth Century, Oxford University, 17 March 2016.

‘An Everyday Thing: Victorians and the Expectations of Railway Travel’. presented at the Consuming the Victorians: Annual Conference of the British Association for Victorian Studies, University of Cardiff, 1 September 2016.

‘For Ladies Only: Locating Women’s History in a Technological Museum’. presented at the Women’s History Network Conference, Leeds Trinity University, 17 September 2016.

‘Industrial Heritage in the Medieval City: Museums, York and Urban Heritage’. presented at the Urban History Group Conference, University of Cambridge, 1 April 2016.

‘The Boredom and Excitement of Suburbs and Rails’. presented at the European Association for Urban History Conference, University of Helsinki, 1 April 2016.

Blyth, Tilly. ‘Beyond the Artefact: Broadening Audiences and Engaging Publics in the History of Technology’. Society for the History of Technology 2015, Albuquerque, New Mexico, 8 October 2015.

‘Interpreting the Information Age’’. Interpreting the Information Age conference, Science Museum, London, 3 November 2015.

‘Seeing and Knowing: The Role of Museums’. Hogan Lovells Lecture Theatre, Palatine Centre, Durham University, 17 November 2015.

‘The Curator’s Perspective’. Museums, Knowledge and Visual Evidence, Kenworthy Hall, St. Mary’s College, Durham, 18 November 2015.

Bond, Sarah. ‘Faith, Hope and Fear: Religion, Magic, and Medicine in the Science Museum’. presented at the Religion and Medicine: Healing the Body and Soul from the Middle Ages to the Modern Day, Birkbeck, 15 July 2016.

Boon, Tim. ‘Creating a Research Culture: Current Activities in Research & Public History in the Science Museum Group’. presented at the National Museums Wales Seminar, Cardiff, 22 February 2016.

‘Histories of Use, Demonstration, and the Material Turn’ to ‘Objects of Research: The Material Turn in 19thc Literary Studies’,. Senate House, London, 18 July 2016.

‘Introduction to Film The Balance (Paul Rotha, 1947)’. presented at the Economics on Film workshop, BFI, 20 May 2016.

‘Introduction to Museums of the New Age’. presented at the Acoustics study day, Science Museum Dana Research Centre & Library, 19 July 2016.

‘Museum Visiting: Ambulatory and Televisual Modes’. presented at the Workshop: Evidence, Museums and Knowledge, Durham University, 17 November 2015.

‘Reflections on Creating a Research Culture’. presented at the The Museum as Method, CRASSH, University of Cambridge, 15 March 2016.

‘Scripts, Performances, Monuments and Encounters: Manifesto for a Project on the Public Culture of Science’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 2 April 2016.

‘Technological Utopia in the 1930s: A Semi-Live Documentary Mash Up’ (Short Version)’. presented at the Bristol Festival of Ideas, Imagining the Future: Screen Utopias, Watershed, Bristol., 22 May 2016.

‘The Department of Science and Art Revisited: The View from South Kensington’. presented at the Nineteenth-Century Art and Science Today, Centre for Nineteenth-Century Studies, University of Durham, 7 May 2016.

‘The Performance of Science Presentation: A Live Video Essay’. presented at the Conference ‘Hands-On History: Exploring New Methodologies for Media History Research’, Geological Society, London., 8 February 2016.

‘The Synaesthetic Museum’. presented at the Workshop: Evidence, Museums and Knowledge, Durham University, 17 November 2015.

‘Who Owns the Past of Science and Technology?’ presented at the Who Owns the Past? Workshop, University of Hertfordshire, 14 December 2015.

Boon, Tim, and Bill Sherman. ‘The Department of Science and Art Revisited: The View from South Kensington’ Plenary Inaugural Lecture. presented at the ‘Nineteenth-Century Art and Science Today’ conference, Centre for Nineteenth-Century Studies, University of Durham, 7 May 2016.

Boyle, Alison. ‘Communicating While Concealing: Exhibiting Britain’s Atomic Piles, 1949-1960’. Porto, Portugal, 2016.

‘Nuclear Power and National Prestige: A Tale of Two Models’. presented at the Artefacts, Milan, 22 September 2015.

‘Showing Science-by-People: Interdisciplinary Approaches’. presented at the International Symposium of Science Museums, National Science Museum of Korea, Daejeon, South Korea, 23 October 2015.

‘Communicating While Concealing: Exhibiting Britain’s Atomic Piles, 1949-1960’. Porto, Portugal, 2016.

Bradford, Jessica. ‘“Reinventing Dioramas”’. presented at the Ecsite annual conference, Graz June 2016, June 2016.

Bradford, Jessica, and Lauren Souter. ‘Co Operating with Communities for Mutual Benefit’. presented at the Ecsite Pre Conference, Museum Im Palais, Graz, 7 June 2016.

Bud, Robert. ‘Blowing Gas across Discourses about Science in 1920s Britain’. presented at the San Francisco, History of Science Society, 22 November 2015.

‘Early Twentieth Century Industrial Research, Science and the Dream of Disruptive Technology’. presented at the British Industrial Research to 1939, Science Museum, 7 December 2015.

‘Early Twentieth Century Industrial Research, Science and the Dream of Disruptive Technology’. presented at the Society of the History of Alchemy and Chemistry, 11 January 2016.

‘Putting a Concept into Context: “Analysing Discourse Practically and Theoretically”, Ideologies and Imaginaries

of Innovation’. presented at the Joint Workshop of the CASTI Research Network and Members of the Science Democracy Network, Munich Technical University, 20 May 2016.

‘Solving the Coal Crisis through Science between the Wars’. presented at the Science Museums and Research, Science Museum Dana Research Centre and Library, 31 March 2016.

‘The Spark Gap Is Mightier than the Pen’: New Technology, Discourse and the Promotion of an Ideology of Science on the BBC in the Early 1930s’. Energizing ideology studies: the maturing of a discipline, University of Nottingham, 28 November 2015.

Calvin, Jean-Philippe. ‘Museums of the New Age’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 31 March 2016.

Carpenter, Oliver. ‘A Plain Substantial Piece of Workmanship’: The Marine Compound Engine and the Tramp Ship in Nineteenth-Century Britain.’ Science Museum Research Seminar Series, 1 December 2015.

Carr, Larry. ‘Collections Hazards’. Hunterian Museum, 23 March 2016.

Cliff, Alice. ‘Curating the Science City: Why Is Scientific Heritage Used to Sell Manchester and the North West of England as a Great Place to Do Business?’ Manchester Central, Manchester, 26 July 2016.

Cliff, Harry. ‘Rare Decays at LHCb’. presented at the QCD@ LHC, Queen Mary University of London, 3 September 2015.

Coleman, Paul. ‘For Health’s Sake - Use Electricity: Electrical Advertising in Interwar Britain.’ presented at the 3 Societies of the History of Science, University of Alberta – Edmonton, Canada, 23 June 2016.

‘For Health’s Sake - Use Electricity: Electrical Advertising in Interwar Britain’. presented at the International Committee for the History of Technology annual conference, University of Porto, Porto, Portugal, 27 July 2016.

Coulls, Anthony. ‘Journey with Maps: An Early Railway in Sierra Leone’. presented at the International Early Railways Conference, Newcastle, 18 June 2016.

Dabin, Katie. ‘The Immortal Instruments of John Dee’. presented at the Part of the Royal College of Physicians events series relating to John Dee exhibition, Royal College of Physicians lecture hall, 11 July 2016.

Desborough, Jane. ‘Dials and User Design’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 31 March 2016.

‘Signs of Astrology on Early Modern Clock & Watch Dials’. presented at the Sensing Time: the Art & Science of Clocks & Watches, V&A, London, 18 June 2016.

Doherty, Caitlin. ‘Landing Manoeuvres: Local and National Contexts for the Display of Flight History in London, Munich and Washington, DC’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 2 April 2016.

Emmens, Stewart. ‘From Hunter to Helmand: Military Medicine Then and Now’’. 14 November 2015.

Gwynne, Robert. ‘Flying Scotsman: The Train, the Locomotive, the Legend’. presented at the Institute of Railway Studies, University of York, 10 March 2016.

‘Snow White to Stephenson: The Prehistory of Railways in Britain’. presented at the 43rd Archaeological Forum, Lancaster University, 5 March 2016.

‘The Famous Flying Scotsman: Marketing, Circumstance and Chance’. presented at the Centre for Evolution of Global Business and Institutions, University of York, 16 September 2016.

Haigh, Alice. ‘“New Wonder House of Experiment and Invention”: The Post Office Research Station at Dollis Hill 1921-1933’. presented at the British Industrial Research to 1939, Science Museum Dana Research Centre & Library, 7 December 2015.

Harding, Colin. ‘The Face of Battle: The Colour Photography of Percy Hennell’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 1 April 2016.

Hawkins, Beth, Christopher Whitby, and Karen Davies. ‘Building Bridges between Informal and Formal Learning Environments, and between Academic Research and Practice’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 1 April 2016.

Hess, Alison. ‘What Do Participative Museum Practices Reveal about Relationships with the Past?’ Who owns the past? Beyond ‘Public History’ and ‘Heritage’ , University of Hertfordshire, 14 December 2015.

‘Who Cares? Interventions in “unloved” Museum Collections’. Who cares? Interventions in ‘unloved’ museum collections, Science Museum, 6 November 2015.

Hicks, Jan. ‘Behind the Scenes Tour of the Collections Centre at the Museum of Science and Industry’. presented at the European Axiell User Conference 2016, Museum of Science and Industry Archive Study Area and Collections Centre, 3 June 2016.

‘Introduction to the Archive Collections at the Museum of Science and Industry’. presented at the Project Hot Pot, Museum of Science and Industry Archive Study Area, 8 February 2016.

‘Introduction to the Archive Collections at the Museum of Science and Industry’. presented at the Artful Prose Workshop, Museum of Science and Industry Archive Study Area, 11 March 2016.

‘Introduction to the Archive Collections at the Museum of Science and Industry’. presented at the Networking session for lecturers and PhD students from University of Manchester School of Materials, Museum of Science and Industry Archive Study Area and Collections Centre, 31 May 2016.

‘Introduction to the Archive Collections at the Museum of Science and Industry’. presented at the Make:Shift Conference 2016, Museum of Science and Industry Archive Study Area, 3 June 2016.

Hicks, Jan, Ceri Forster, Gareth Pugh, and Sarah Baines. ‘Introduction to the Object and Archive Collections at the Museum of Science and Industry’. presented at the Unit X Project for MMU School of Art, Museum of Science and Industry Archive Study Area and Collections Centre, 9 March 2016.

Highfield, Roger. ‘Big Data Need Big Theory Too’. presented at the Solvay Workshop - ‘Bridging the Gaps at the PCB interface’ Multiscale Modelling in Physics, chemistry and Biology, Brussels ULB - Campus Plaine Solvay Room, 19 April 2016.

Hurley, Selina. ‘Gibson’s Pharmacy’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 2 April 2016.

‘Re-Imagining the Gibson’s Pharmacy at the Science Museum’. presented at the Pharmacy History: sources & resources, Wellcome Trust, Euston Rd, 18 April 2016.

Johnson, Alexandra. ‘The Rubbish Collection’. Environments in Public conference, 3 November 2015.

Kay, Alison. ‘Ambulance Trains: From Fighting to the Home Front’. presented at the Voices of the Home Front conference, National Archives, 9 September 2016.

Kirby, Jack. ‘Collecting for the Future’. presented at the Art Gallery & Museum Studies student seminar, University of Manchester, 5 October 2015.

Kolkowski, Aleks. ‘Hearing Artefacts: Revealing Incarcerated Sounds within Museum Collections’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 31 March 2016.

Lee, Ling. ‘Communicating Controversial Science’. Science and Society, University Museums Group Conference 2015, Durham University, UK, 24 September 2015.

Leskard, Marta. ‘Conservation of the Aerial Tuning Coil from Rugby Radio Station’. BigStuff conference, 3 September 2015.

‘Finding Sustainable Construction Methods to Enable the Preservation of Museum Collections in Storage’. University of Bath, 8 October 2015.

‘The Potential of a Hygroscopic Building Material to Regulate Relative Humidity in Museum Storage’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 1 April 2016.

Liffen, John. ‘Cooke and Wheatstone’s Telegraph’. presented at the Science Museums and Research, Science Museum Dana Research Centre and Library, 31 March 2016.

McLean, Andrew. ‘Conservation and the Flying Scotsman’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 1 April 2016.

‘Flying Scotsman: Speed, Style and Service’. presented at the Institute of Railway Studies, University of York, 10 March 2016.

‘The Most Successful Train in the World?’ presented at the High Speed Rail Technologies conference, Institute of Mechanical Engineers, London, 26 September 2016.

Millard, Doug. ‘Onward to Mars: Tsander, Yuon and the Making of Cosmonauts’. presented at the UK Space Conference, Charterhouse School, 21 July 2016.

‘The Making of Cosmonauts’. Society for Cooperation in Russian and Soviet Studies, Brixton, 9 October 2015.

Mitchell, Jack. ‘A Touchy Subject: Touch Pieces in the Science Museum’s Collection’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 2 April 2016.

‘A Touchy Subject: Touchpieces and the Power of Touch’. presented at the Religion and Medicine: Healing the Body and Soul from the Middle Ages to the Modern Day, Malet St. Building, Birkbeck College, London, 15 July 2016.

Morgan, Frances. ‘Excavating MUSYS: A Media-Archaeological Investigation into Early Computer Music’. Centre for Contemporary Arts, Glasgow, 1 April 2016.

‘The Problem with Pioneers: How Media Narratives of Exceptional Women Distort the History of Female Involvement in Electronic Music’. presented at the Alternative Histories of Electronic Music Conference, Science Museum Dana Research Centre and Library, 16 April 2016.

Morris, Peter. ‘Alternative Paths in Industrial Research: The Case of IG Farben’. presented at the British Industrial Research to 1939 workshop, Science Museum Dana Research Centre and Library, 7 December 2015.

‘Another Kind of High Pressure: Walter Reppe and High-Pressure Acetylene Chemistry’. presented at the Society for the History of Alchemy and Chemistry, Morris Award Symposium, Science Museum Dana Research Centre and Library, 11 February 2016.

‘Chemical Museums as a Cultural Manifestation of Applied Chemistry’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 31 March 2016.

Nahum, Andrew. ‘Frogs, Frequencies and Forks: The Bulova Accutron and the Tuning Fork as a Time Standard’. presented at the Antiquarian Horological Society Lecture, Royal Astronomical Society, Burlington House, Piccadilly, London, 26 November 2015.

‘The Tuning Fork in Science and Technology - an Alternative’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 31 March 2016.

Reeves, Hannah. ‘The Railway Review, 1900 – 1948’. Modern Records Centre, Warwick University, 2016.

‘Telling Stories: The Challenge of Representing the Idea of the “Railway Family” within the National Railway Museum’s Collection’. presented at the Science Museums and Research 2016, Science Museum Dana Research Centre and Library, 31 March 2016.

‘Who Were the Railway Women’s Guild? A Case Study of Gloucester, 1900–1948’. presented at the Women’s History Network Conference, Leeds Trinity University, 17 September 2016.

Regel, Ben. ‘Informing Tear Repair Techniques of Doped-Fabric Aircraft at the Science Museum’. presented at the Science Museum Inaugural Research Conference, Science Museum Dana Research Centre & Library, 1 April 2016.

‘Investigating the Mechanical Properties of Historic, Doped-Fabric Aircraft’. presented at the Turn and Face the Change: Conservation in the 21st Century, ICON Conference 2016, 16 June 2016.

Rimmer, Rachel. ‘MSI: Historic Working Machinery and the Balance between Being Ethical and Legally Compliant at the Icon’. Metal In Motion Conference, National Museum Wales, 16 November 2015.

Roberts, Phillip. ‘The Projection Microscope, Magic Lantern Entertainments and the Scientific Trade’. presented at the Science Museums and Research 2016, Science Museum Dana Research Centre and Library, 31 March 2016.

Rooney, David. ‘Commodifying Traffic Congestion: How Plans Get Real and Who Benefits’. presented at the Royal Holloway Landscape Surgery, Bedford Square, London, 20 October 2015.

‘Plenary Lecture’. presented at the 30th European Frequency and Time Forum, University of York, 5 April 2016.

Santana, Noeme. ‘Photography as a Business Practice in the Civil Engineering Industry’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 1 April 2016.

Serveta, Maria. ‘Instruction Panels for Interactive Exhibits’. presented at the Ecsite 2016, Graz, Austria, 11 June 2016.

Shearsmith, Jan. ‘Introduction to the Archive Collections at the Museum of Science and Industry’. presented at the Study Session for MMU School of Art Architecture Students, Museum of Science and Industry Archive Study Area, 8 February 2016.

Smith, Rebecca. ‘Rubber Stamps, Chinagraph, Captions and Coffee Stains: Exploring Bureaucracy through Materiality in the Daily Herald Picture Library’. presented at the ‘Interdisciplinary Perspectives on Material Culture, University of Kent, 8 June 2016.

Souter, Lauren. ‘Collaborating and Co – Creating with Communities: How and Why?’ presented at the Ecsite Conference, Convention Centre, Graz, 9 June 2016.

‘Interactive Museum Collections: How?’ presented at the Ecsite Conference, Convention Centre, Graz, 9 June 2016.

Spain, Thomas. ‘Unpacking Freight: The Railway Wagon as a Symbol of Socioeconomic Change’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 31 March 2016.

Spain, Thomas, and Lawrence Black. ‘The History and Advent of Self-Service in Britain: Distribution, Public Reception and the Perception of Markets’. presented at the Imagining Markets workshop, University of Exeter, 15 June 2016.

Vaccarini, Desiree. ‘Art and Science: Can It Really Work?’ presented at the Ecsite conference, Graz, Austria, 11 June 2016.

Wall, Oisín. ‘An Unrealised future: Streamline Moderne in Post-War Medical Technology’. presented at the Science Museums and Research Conference, Science Museum Dana Research Centre and Library, 2 April 2016.

‘Mass-Screening, Hope, Empire, and a Machine: Reconceptualising the Object as Network’. presented at the Medical Objects: An Interdisciplinary Workshop, Keynes Library, Birkbeck College, London, 13 July 2016.

‘Sacred Tourist Tat: The Museum’s Elevation of Profane Objects’. presented at the Religion and Medicine: Healing the Body and Soul from the Middle Ages to the Modern Day, Malet St. Building, Birkbeck College, London, 15 July 2016.

‘The Museum as a Site of Academic Research’. presented at the London Arts and Humanities Partnership Conference, Strand Campus, King’s College, London, 20 June 2016.

Jacob Ward. ‘“The Future Must Be Invented, Not Predicted”: Human Imagination and Computer Prediction in the British Post Office’. presented at the Annual Meeting, Society for the History of Technology, National University of Singapore, Singapore, July 2016.

Young, Georgina. ‘“Nought to Glass Case in Nine Months!” : Collecting, Selecting and Displaying Contemporary Objects’. presented at the Contemporary Science team - talk series, Dana Centre, 23 May 2016.

Our students

Pre-2013 Collaborative Doctoral Awards			
Name	Project	Museum	University
Helen Evenden	How Motor Cars were Designed in the UK	Science Museum	Royal College of Art
Tom Richards	Oramics: Precedents, Technology and Influence*	Science Museum	Goldsmiths
Cat Rushmore	Chemicals in the Home*	Science Museum	Oxford Brookes
Collaborative Doctoral Partnership 2013+			
Name	Project	Museum	University
Erin Beeston	Spaces of Industrial Heritage: a history of uses, perceptions and remaking of the Liverpool Road Station site, Manchester	Museum of Science and Industry	University of Manchester
Caitlin Doherty	Representations of Flight: The Eighteenth Century Imagination and Modern Collections	Science Museum	University of Cambridge
Alice Haigh	'Research is the Door of Tomorrow': the networks and culture of the Post Office Research Stations (Dollis Hill PhD 1 of 3)	BT Archives / Science Museum	University of Leeds
Tanya Kenny	Britain's Railways in the Great War, 1914-1918	National Railway Museum	University of Aberdeen
Emily Marsden	2016: Media in the First World War	Media Museum	University of Durham
Laura Newman	Making Germs Real: creating, performing and learning about a dangerous invisible thing in the public sphere, c.1860-1930	Science Museum	Kings College London
Noeme Santana	Building an empire: corporate vision and the global geographies of infrastructure	Science Museum	Royal Holloway, University of London
Thomas Spain	Food Miles: the Imaginings, Politics and Practices of Food Distribution in the UK, ca1920-1975	National Railway Museum	University of York
Collaborative Doctoral Partnership 2014 +			
Name	Project	Museum	University
Rachel Boon	The Research Life of the Established 'Station' in the 'long Cold War': Analogue and Digital Era (Dollis Hill PhD 2 of 3)	BT Archives / Science Museum	University of Manchester
Paul Coleman	Danger – High Voltage: the rise of megavolt electricity supply in 20th century Britain	Museum of Science and Industry	University of Leeds
Charlotte Connelly	Investigating the Flow of Electrical Ideas through the instruments of their discovery, from 1800 – 1850	Science Museum	University of Cambridge
Hannah Reeves	Women and the 'railway family' (1900- 48)	National Railway Museum	Keele University, NRM
Benjamin Regel	Conserving Doped Fabric Aircraft: historic origins; heritage outcomes	Science Museum	Imperial College
Phillip Roberts	Magic Lantern Culture in Britain (1850 – 1920): Exhibition, Reception and Mixed Media Landscapes	National Media Museum	University of York
Amanda Stevens [new student, started 2017]	Home on the rails: the design, fitting and decoration of train interiors in Britain c.1920-1955'	National Railway Museum	Open University
Jacob Ward	Research Transplanted and Privatised: Post Office/British Telecom R&D in the Digital and Information Era (Dollis Hill PhD 3 of 3)	BT Archives / Science Museum	University College London

Collaborative Doctoral Partnership 2015 +			
Name	Project	Museum	University
Gemma Almond	Correcting Vision in Nineteenth-Century England: A social, cultural, medical and material history of spectacles	Science Museum	Swansea University
Josh Butt	The Rise and Fall of the Manchester Motor Industry, 1896-1939	Museum of Science and Industry	Manchester Metropolitan University
Frances Morgan	Electronic Music Studios in Musical, Commercial and International Perspective	Science Museum	Royal College of Art
Tom Ritchie	Meccano: The nuts and bolts of science	Science Museum	University of Kent
Rebecca Smith	The Daily Herald: Popular desires and managing the production of photographs	National Media Museum	De Montfort University
Kevin Tracey	Calculating Value: using and collecting the tools of early modern mathematics	Science Museum	University of Swansea
Sophie Vohra	Railways and Commemoration: Anniversaries, Commemorative Cultures and the Making of Railway History	National Railway Museum	University of York
Dom Weldon	Mapping the Historical Growth & Cultural Context of the British Fixed Line Network	BT Archives	King's College London
Collaborative Doctoral Partnership 2016 +			
Name	Project	Museum	University
Elizabeth Adams	Literary Cultures, Social Networks and the Railway Worker, 1840-1920.	National Railway Museum	University of Stirling
Caroline Avery	"Making the Pulse: the Reception of the Stethoscope in nineteenth century Britain, 1817-1870."	Science Museum	University of Leeds
Joshua Scarlett	Instruments and their Makers: A study of experiment, collaboration and identity in seventeenth-century London	Science Museum / Royal Society	University of York
Aron Sterk	Emanuel Mendes da Costa (1717-1791): multicultural and multinational networks in Georgian London	Royal Society / Science Museum	University of Lincoln

*Subsequently submitted / awarded.

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. 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 & 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
Editor, 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, 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 The Matter Factory: A History of the Chemistry Laboratory (Reaktion, 2015).





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Arts & Humanities
Research Council