The Public History
of
Science, Technology, Engineering, and Medicine (PHoSTEM)

An AHRC-funded Research Network between
The Science Museum,
The Institute for the Public Understanding of the Past,
and The University of Leeds.

"Science Museums in a Changing World"

Workshop organised by the Department of Research and Public History, The Science Museum, and hosted by the Dana Centre, The Science Museum

PHoSTEM reports authored by the Institute for the Public Understanding of the Past, by
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For further information about IPUP, please go to www.york.ac.uk/ipup/

On Saturday the 13th April, 2013, the workshop entitled "Science Museums in a Changing World" took place at The Science Museum's Dana Centre, London. This event was organised by the Department of Research and Public History at The Science Museum, London, and was held at the Dana Centre, The Science Museum. The final workshop in a series of three events that explore the ways audiences engage with the history of science, technology, engineering and medicine. This workshop brought together a range of academics and practitioners for a day of discussion. Building on the previous two workshops, the third event sought to examine the ways in which academics and practitioners can establish symmetrical impact for their institutions through developing meaningful relationships with each other.

Professor Helen Weinstein (Institute for the Public Understanding of the Past)

The workshop was opened by Professor Helen Weinstein, Founding Director of the Institute for the Public Understanding of the Past (IPUP), University of York. Weinstein began by welcoming those present to the workshop and promoting the use of live tweeting throughout the event as a way of sharing thoughts and responses to the day's events publicly. A Storify of the twitter activity relating to the workshop can be accessed here http://storify.com/historyworkstv/museums-and-the-public-history-of-science-technolo.

Weinstein then spoke about the inter-connected nature of the PHoSTEM workshops from the point of view of the first event. Weinstein spoke about how recapitulating the discussions and thoughts that arose from the earlier workshops can help shape ideas about where and how this project can develop in the future. The delegates were reminded of the range of industrial and technology focussed museums that were represented on the 7th December 2012 at the PHoSTEM workshop, hosted by the National Railway Museum in York. These included the National Railway Museum, Beamish, Tyne and Wear Archives & Museums, Ryedale Folk Museum, and The Science Museum, with over one hundred delegates present in the IPUP organised events to listen, learn and discuss. The workshop invited both curators and volunteers to examine the motivations of those who give their time to participate with museums and archives. These case studies were particularly important, Weinstein stated, because they present those who actively participate with an opportunity to voice their opinions and explain their motivations.

Weinstein then spoke about some of the unexpected outcomes of the event. These included a discussion that interrogated the complexities of terminology in relation to volunteer/expert researcher activity. The nature of this discussion centred on the question of what language do academics use to show that they are open to equitable partnerships being established with those outside of academia. We learnt that from the expert researchers' experience the most successful projects are collaborative and exhibit substantial participation from the formative stages. These are projects where there is an understanding, respect and recognition that their research capacities are valuable and equitable to those of the academics and staff working on the projects.

The National Railway Museum's relationship with the London and North Eastern Railway (LNER) was cited as an example of this. The LNER volunteer experts are iteratively, over several years applying their time and specialised knowledge to working on a cataloguing project for the museum. Weinstein recalled that the expert researchers also spoke about a "golden age of retirement". They drew attention to their generation's financially stable status as an explanation of why this group of retired professionals can devote their time and expertise to volunteer in the museum and heritage

sector. This also served, Weinstein stated, as a call for the museum and heritage sector to acknowledge and utilise the range of skills that 'lay researchers' possess.

Weinstein said that from a theoretical point of view the key learning of the workshop was about participatory practice and that it made her reflect on theories of public history. Often in the UK we are dealing with the American paradigm of what public history might mean. Public history in America, she said, often pertains to history that takes place outside of the 'ivory tower'. Weinstein then spoke about this in relation to her own work and her thinking about the ways we might be defining public history in new ways. History in the UK tradition, she stated, has often been associated with history from below. One of the things that came through in the first workshop, which Weinstein suggested could be thought about in this workshop, was that public history can also mean history *with* the public. Public history can be about collaboration and equitable partnership between the public, academics and practitioners.

Weinstein concluded her recapitulation of the York workshop by commenting on an aspect of the first event which was most important. We learnt, she said, that best practice is about equitable power relationships and substantial participation. It is not about "bolt-on" public projects as after thoughts to research projects. It is about building into the museum or heritage site an ethos of true collaboration. Weinstein then ended by saying that she hoped we could take forward these ideas about participation and public practice when we think about the tasks and challenges faced by science, technology, engineering and medicine collections surrounding public engagement.

Professor Graeme Gooday (University of Leeds)

Weinstein then introduced Professor Graeme Gooday, Professor of History of Science and Technology at the University of Leeds, to offer a recapitulation of the learning from the second workshop which took place at the Brotherton Library, University of Leeds.

Recalling a remarkably snowy day on Friday 18th January 2012, Gooday spoke about the high attendance at the second workshop which focussed on the theme of museums' engagment with universities. Building on the theme from the York workshop, which focussed on practice and theory of working collaboratively with the public, he spoke about how the second workshop had centered on the increasing identification of

universities as helpful resources for supporting audience engagement in museums. Gooday then reviewed the main aspects of the discussion at the Leeds event. He broke these down into three key points.

The first point focussed on how the Leeds workshop explored the ways in which we can understand the many perspectives of the audience. Understanding museum audiences and how they respond to museum collections matters as much as understanding the collections themselves. Although museums have long been engaged with empirical studies of their visitors, historians of science can offer fresh interpretations of STEM, and of STEM collections in particular, to generate interesting new ways of generating audience interest for museums. One such angle which Gooday shared was the value of treating visitors not as passive admirers of technology, but as users of it. By identifying themselves as users of past technologies visitors can be inspired to approach collections-based exhibits with greater emotional and empathetic complexity; Gooday emphasized that there are of course other useful ways of modelling visitor behaviour. Through a range of case studies provided at the Leeds workshop it was evident that there are many resources out there for museums and universities to work together to re-engage audiences or even re-enchant them to ensure repeated visitation and meaningful engagement with STEM collections. Moreover, by breaking down institutional boundaries through collaborative workshops such as this and by drawing freely from some possibly unexpected sources, museums and universities have potentially much to gain from fruitful interactions.

Gooday next addressed the nature of such collaborations between museums and universities. He acknowledged that not all museums wish to collaborate with universities and vice versa; nevertheless there are examples of good partnerships to follow. The key principle is that in order for these partnerships to be successful the collaboration must be premised on a shared understanding of goals and values. He mentioned that many museums have understandably been irritated by

academics that present an idea based on their research goals without bothering to find out first what the museums' priorities might be. He used this as an opportunity to note how Collaborative Doctoral Students are now often best placed to navigate these relationships, since they come to be "bilingual" in academic and museum languages and through their collections-based research can come to embody the values of such collaborative work.

Gooday then challenged the traditionalist counter-claim in higher education that academic research risks being diluted by working on museum collections. He did this by discussing an example discussed at the second workshop of the successful recent collaboration between the Thackray Medical Museum in Leeds and the Centre for the History & Philosophy of Science, University of Leeds. Gooday, having worked with the Museum on developing new interpretations of its high-priority collections, acknowledged the great interest to the historian in encountering collections of medical trade catalogues, obstetrics equipment, and hearing aids which had not been properly studied before, and thus offered a wealth of material for academic study. Postgraduate projects on such collections were amongst the outcomes generated from collaboration between universities and museums, and these concurrently brought into being new academic knowledge and museum display material - as well as building and strengthening the collaborative relationship involved. Gooday emphasized that there are long term benefits to establishing these relationships. Carefully managed and well-resourced collaborations between Universities and Science Museums can potentially bring great enhancements both to audience encounters with museum collections and also to enhanced 'impact' for University research. Both kinds of institutions have the skills and experience, he said, to assist in supporting the other in their goals - especially at a time of diminished funding for museums and greater pressures being placed on the academic institutions to record and show that they have created benefits for wider society.

Gooday then concluded that this present symbiosis was one that he felt will be for the long-term, not just an opportunistic short-term dalliance. Irrespective of the technicalities and mechanics of the current form of the Research Excellence Framework (REF), academics are thinking about how universities and museums benefit symmetrically. Even if the REF were to go, he said, it would be ideal to make sure we carry on this culture of maintaining shared values and collaboration into the indefinite future. He concluded with the hope that we can continue this sort of discussion at this third workshop.

Dr Tim Boon (The Science Museum)

Professor Graeme Gooday then introduced Dr Tim Boon, Head of Research and Public History at The Science Museum who discussed the agenda and motivations for the current workshop. After thanking Professor Weinstein and Professor Gooday, Boon reflected on the outline he created in the AHRC *Case for Support* for PHoSTEM funding, approximately eighteen months ago.

The territory is essentially triangular, he said. First, there are lay audiences for the history of science and technology, which had been a focus for the York meeting. Boon referred to Weinstein's earlier outline of the York meeting to articulate that it was designed, in part, to reveal some of the subjective experience of the part of that 'unknown audience' that has worked closely with museums, especially as expert researcher/volunteers. The second part of this triangular framework includes universities and the academics who study history of science and technology and may well be interested in what effective communication with 'lay audiences' can produce. This was the focus of the Leeds workshop. Thirdly there are the museums of science and technology with substantial historical collections. Boon identified this workshop, under the heading of 'Science Museums in a Changing World', as being an opportunity to address some core questions that also matter to universities and to 'lay audiences'. These included: Can museum science displays convey the historiographical tenor of modern history of science and technology? Are old machines and instruments difficult for visitors? Are there lay modes of thinking about the past, especially amongst 'amateur' historians, that can shine a new light on collections, and stimulate new modes of display? How can museums respond to the liberations of greater informality in society and the fluidity of online activity to do their job in relation to history of science better? These questions formed the agenda for the third workshop.

Boon then returned to a recapitulation of the aims of the workshops. He stated that the partners wanted to bring together people who, although they work in related fields, rarely all speak to each other. These, at the time, were enumerated as:

The professional staff of museums. Boon felt that this had been successful and that these people had been present at the meetings.

Historians of science and technology who study the history of relations between science and the public in the past, and the media of communication used in various historical contexts. He said that this had been successful as those people had been present at the second workshop.

The broader community of practitioners of public history in printed, online and broadcast media, and scholars who study this aspect were less well represented. Boon reflected that it had not proved possible to involve this group of academics and practitioners within all the three workshops, and that this ambition would be carried over into future projects.

Boon acknowledged that when establishing a network such as this, you may not reach everyone that you intend to bring in but, on re-reading the case for support, it read more like a manifesto for a field of endeavour than the justification for three days of workshops! This, he said, means that there is plenty more to discuss in future enterprises that lead on from this workshop series.

Recalling the aims and objectives, Boon said they had set out to establish a long term network of academics and museum staff concerned to develop more effective and engaging experiences for the lay public in the history of science, technology and medicine. To publish on these concerns was proposed as a way of provoking the development of good practice in museums, public history, and knowledge exchange from universities into the public sphere. Accordingly, a summative article from the workshops will be produced in the months ahead.

One method being deployed by The Science Museum is to promote experimental collaborations with lay groups in the development of new kinds of displays, resources, and events in science museums. It is hoped thereby that it will become possible to convey more effectively the history of science to visitors in ways that they find congenial and engaging. This is part of the long-term agenda, Boon said, and it makes sense to build on the momentum of these workshops to invent more mutually interesting projects. He then mentioned that there will be one more meeting associated with this network. This will be a meeting to explore some of the implications of the PHoSTEM network with some of the HLF-AHRC-funded 'All our Stories' community heritage groups.

In the final part of his introduction, Boon spoke about the thematic aspects of organising the third workshop. The original title of this workshop was 'Is science a special case in museology?' Boon hoped to open up discussion of the possibility that science and technology museums, by virtue of their subject-matter (some of it highly abstract and immaterial) might be intrinsically different from museums of art or archaeology, where the museum object is widely accepted to be the central factor in the museum's enterprise. Boon admitted that he had been over-optimistic in thinking that this could be discussed after just two workshops. Rather, this is a complex, summative, issue and so the partnership had decided to devote much of the third workshop to important groundwork, under

the heading ‘Science Museums in a Changing World’, and come to a first discussion of this big question in the concluding panel discussion.

To conclude his presentation and the introduction to the workshop, Boon provided an overview of the three sessions to follow. Speaking about the first panel, Boon said that it seemed that museums of science and technology might be facing a kind of existential crisis. He argued in the ‘Case for Support’ that, at a time when digital media has increasing cultural presence, questions are begged about the comprehensibility and value of museums' collections of physical objects. He noted that he was referring not to the opportunities of digital media, but to the reduced familiarity of the mechanical and visible level electronic technologies to audiences today compared to a generation ago. For science museums in particular, Boon said, collections may be becoming more remote from audience experience as visitors increasingly lack the familiarity with machines that were commonplace in the nineteenth century; or even 30 years ago, when many people in this country worked in manufacturing. Returning to the York workshop, Boon noted that the only reference to this theme were some very interesting observations made by Hazel Edwards in her talk about the Newcastle Discovery Museum in a post-industrial age. Feeling that the issues surrounding our post-industrial society deserved more prominence in the main programme, the first session in this third workshop would be devoted to these issues.

Moving onto the second session, he noted that museums are also modifying how they operate because of changes in today's society and culture. These adaptations include reduced deference to authority, increased informality of communication, and greater expectation of participation in cultural production.

In relation to the third session, which focussed on The Science Museum’s co-curation experiments, Boon cited evidence of the autumn 2010 International Workshop ‘Co-Curation and the Public History of Science & Technology’ to show that there is a clear, but relatively unexplored, kinship between public history, co-curation and other kinds of participation. A report, written by Dr Tim Boon, from this event can be found here:

http://www.sciencemuseum.org.uk/about_us/about_the_museum/~/media/CE95CA4D83594B17A03CB435378D3779.ashx

Boon argued that public history is not only about professionals doing good popularisation. The term ‘public history’ can be used to refer to the ways in which ‘lay people’ pursue historical activities for fun, whether that be family and local history, collecting, consuming historical magazines and television programmes, or indeed museum visiting. Co-curation and other similar techniques

gathered together under the umbrella of 'participation' describe a range of practices in which 'lay people' work to develop displays and programmes within museums. Boon finished by stating that this was the agenda that has driven The Science Museum's public history programme and in the third session the delegates will hear about some of the projects that have been developed so far.

Session One: Material Culture in a De-industrialised/ Post-industrialised World

The first session of the workshop was entitled 'Material Culture in a De-industrialised/ Post-industrialised World' and was chaired by Dr Tim Boon. Boon introduced the first speaker, Dr Hiroki Shin, Research Associate at the Sustainable Consumption Institute at the University of Manchester, who until recently worked as a Postdoctoral Research Associate at the Institute of Railway Studies and Transport History, University of York and National Railway Museum.

Dr Hiroki Shin (University of Manchester): Material Culture in Practice: History of Technology Travelling across Academia and Museums.

Dr Shin began by speaking about the consequences of the Great Eastern Japan Earthquake in 2011 and the subsequent nuclear crisis. Since these events took place the Electric Power Historical Museum, formerly run by the Tokyo Electric Power Company (TEPCO) has closed. He also mentioned that another TEPCO-owned museum, the Electric Energy Museum (also known as Denryokukan), has also officially closed down. Shin used these examples to explain that the closure of museums, particularly corporate museums, is exemplary of the tenuous relationship between private organisations and public engagement in the field of scientific and technological knowledge. In this introduction Shin stated that these closures have greater implications regarding the fostering of public knowledge about energy. The disappearance of museums in Japan, Shin said, highlights the importance of the physical museum space in society. The materiality of knowledge is something that has played a

significant part in public learning throughout the past few decades and is still integral to our understanding of society, culture and technology.

However, Shin noted, many historians still focus on producing traditional outcomes of research such as the written text. Some critics argue that this logocentric tendency when studying material culture is a consequence of prioritising culture over materiality. Shin suggested that we should also note that our studying of culture is informed by the information technology of text based communication.

It is here that Shin asserted that the increasing amount of collaborations between universities and museums can help steer focus towards examining material culture with a closer emphasis on materiality. Shin also acknowledged the obstructions that may be encountered within these partnerships, specifically between research and exhibition. Even within a balanced partnership it is difficult for historians to envision the research output, and similarly it is difficult for practitioners when collaborating with academic historians who scarcely engage with the material output. Some researchers, he said, still assume that their chief contribution to an exhibition will be to provide the "text-book on the wall".

Shin stated that a mutual effort is needed to counter this. If we want to increase the level of collaborative work then we are faced with two options. The first option is to develop the strength of working relationships between academic institutions and museums by including collaboration from the design stages of the project through to the public output. The second option is to allow the gap to widen between academia and museums with regard to specialised skills and knowledge.

Given the current shifts in information technology, the possibility of this gap widening is very real. The developments and growing availability of motion sensor and motion capture technology is particularly significant. Shin identified the potential this has to change how information is exhibited, retrieved and handled. These second-generation technologies, he said, seem to represent a return to bodily engagement for the user.

Shin then moved onto a discussion of the Railway Museum's (Japan) use of a digital simulator in 2007. This simulator allowed users to experience the action of driving a steam train by using their bodies to recreate actions necessary for that task. Shin acknowledged that this is not a unique use of this technology but the simulator was innovative in a different respect. Shin spoke about how the museum's simulator not only allows visitors to experience the lever resistance and jolts of a train driving but were also engaging with the experience of working on a steam train. This was achieved through a driver and stoker mode which allowed users to stoke the engine that in turn effected the overall experience of the simulator. Although restrictions meant that the museum wasn't able to recreate a more in-depth experience (using smells, heat and smoke) they were able to recreate the

bodily momentum and coordination necessary for driving a train. Shin said that there are a limited number of museums taking advantage of this technology and he did not believe that new technologies will take over the conventional exhibition methods of museums. However, he felt that in the future technologies will become more present in parts of the museum where visitors are required to become more physically active than just walking around the site.

Shin then moved onto a discussion of the theoretical approaches to academic practices, which he said had generated interest from historians who wanted to apply it to their investigations into the past. A stronger emphasis on everyday life and investigations into how artefacts were used is illustrative of a shift in historian's interest towards studying the materiality of the past. He then spoke about research in the study of transport marketing and the new generation of scholars who are interested in the material culture of posters, timetables, maps and materials that were used in practice. Drawing on his own work at the National Railway Museum and their designing of an iPhone app entitled 'The East Coast Timeline'. Shin spoke about the original concept for this app. He informed the delegates that it had originally been conceived as an accompanying app for a physical exhibition. This would have foregrounded for the public an experience of using guides, timetables and interacting at the ticket office to give the user a co-ordinating experience of a past rail-travel behaviour. Shin said that this would actively work against the disjointed experience that we usually get in an exhibition which presents cultural ephemera in a range of displays, often lacking continuity.

Shin highlighted that the practice of incorporating bodily movement into an exhibition, be it throwing coal into a fire or buying a ticket, can be beneficial to museums of science and technology. Shin also identified that divergence from prescribed usage of technology, specifically rail travel, can also open up interesting routes to examine political and social interactions with technology. This can incorporate narratives around disasters and errors. He briefly returned to the subject of the TEPCO's decision to close down their museums. He felt this was a bad decision. The company, he said, could have transformed the museum to facilitate public discussion and experience about the materiality of energy. When people feel disconnected from the co-ordination of technology they can experience fear, distrust and antagonism with technology and those that control it.

Shin concluded his presentation by saying that science and technology museums have a good record of engaging with their audiences through interactive means. Their range of diversity, he said, adds further depth to their engagement between their audiences and their collections. In that endeavour a close relationship between academia and museums is indispensable and if museums want to incorporate these practices into their exhibitions they require in-depth, specialist knowledge of historical practices in a social and political context. This is the kind of knowledge that academic

historians can provide. Historians, he said, can also benefit equally from the close relationship with museums. Through their acknowledgement of materiality, museum practitioners can provide academic historians with new routes and approaches to engaging with the past, present and future.

Professor Tim Dant (University of Lancaster): Experiencing Science: The Phenomenology of Body, Mind and Matter

The second speaker was Professor Tim Dant from the University of Lancaster. Boon cited a quote by Dant which he felt was particularly pertinent to specific aspects of the workshops, "My interest is in understanding how human beings use things in their ordinary lives without paying much attention to the way they shape their everyday practices and connect them with other people." Professor Dant followed this by announcing his status as a sociologist, (highlighting that he is not a historian and museologist), but the overlap occurs because of his interest in cultural interaction with materials. This, he said, is one of the ways we can understand how people connect to culture and understand who they are through the things they interact with. Dant then spoke about framing his presentation through Edmund Husserl's reflections on science. He would use this to think about how museums can present science to visitors, and later give an example of a visit to Manchester Museum of Science and Industry (MOSI).

Dant spoke about the years leading up to Husserl's death in 1938 and his writings which charted a crisis in European sciences. Husserl had become concerned that as the sciences became more consistent in their methods and more confident in their success in generating positive knowledge, their failure to answer questions about the meaning of human existence became more apparent. Although science aspired to knowledge that was universal, Husserl felt that it failed to provide any insight into human experience. Since the Renaissance, science had become better at producing objective facts. But in doing so had become separated from philosophy which addressed the issues of reason including values, ideals and ethics – those elements of knowledge essential for the development of the human, subjective spirit. Here Dant quoted Husserl, "Positivism, in a manner of speaking, decapitates philosophy" (Husserl 1970: 9).

Dant then noted a temporal correlation between Husserl's publication entitled *The Crisis of European Sciences and Transcendental Phenomenology* (written pre-1939 but published in 1970) and the Museum of Science and Industry which first opened in Manchester in 1971. Dant articulated that his aim was to examine why it is so difficult to present science in a museum by using Husserl's interest in the history of science and how it relates to the lives of ordinary people. Dant then stated that modern science is very difficult to represent in a museum partly because the sphere of 'geometric idealization' and 'mathematical existence' of post Galilean science is difficult to represent. It is difficult to represent, he said, because it is dull. It depends on repetitious, precise measurement, mathematical analysis and abstract theory.

The general museum audience, Dant said, has very limited understanding of science and is seeking not pure knowledge but experiential knowledge. This is knowledge that connects with their "life-world" - a phrase used by Husserl to describe the perceptible, subjective and tangible experiences of life. The result is that a museum has to revert to history and biography to tell us about science.

Dant then moved on to examine the ways in which the Museum of Science and Industry (MOSI) in Manchester presents science to its visitors. Dant described MOSI's science room as having a timeline on a wall that depicts the last couple of hundred years with a large amount of different sized text, interspersed with images and glass cases containing scientific equipment. Another part of the exhibition space has four small rooms each devoted to world famous Manchester scientists each exhibited similarly. Dant played us a video clip that showed the room dedicated to John Dalton. He noted that despite a lot of evidence suggesting that the exhibition was well researched and presented, it was in fact difficult to understand what John Dalton had discovered. He felt that accessing the information would have been quicker and more easily gathered from a book than through the multi-media presentations.

What museums are good at, he said, is addressing the senses. By engaging with the senses and the imaginations of visitors they stimulate people's general curiosity, giving them experiences that are memorable and relevant to their lives. Dant presented the argument that it is probably not possible to present science to the museum-going public. To do that it would need to make visitors follow the processes of scientific formulae and undertake endless experiments; they would have to become

scientists and discover through the application of scientific method, what science is. Dant reiterated his earlier point, saying that experience is what museums are good at; creating sights and sounds and above all, offering proximity to artefacts, usually artefacts that have been made by people at some time in the past. These artefacts, at a museum like MOSI, he said, are the traces of science in our "life-world". To illustrate this point he displayed another video clip taken at MOSI which showed the functioning Durn Mill engine (built in 1907 by the Manchester engineer, John Saxon). Dant listed the visceral response one has when proximal to the engine. This led on to him saying that there are two great strengths to MOSI. These are their collection of artefacts, particularly the range of machines, and the significance of their artefacts to the local and regional area.

Dant then moved on to talk about MOSI's *Xperiment Gallery* as a space where children can experience experiments that relate to scientific knowledge. An example of one of these tactile experiments is a display that allows a visitor to feel and see the viscosity of different liquids by pumping air bubbles through them. Dant noted that it is striking how much text is required to explain and make relevant the sensory experience of science. This display was comprised of a sequence of lights switching on and off on a rapidly rotating stick, thus creating two dimensional shapes and patterns. Dant pointed out that no explanation is given with this display, it is presented as an experiment in perception – a purely aesthetic experience, not scientific. Dant used this example to articulate a point that although there are different perceptual experiences in the *Xperiment Gallery*, which can be made meaningful through text and explanation, there are no measurements, formulae, abstract theory and therefore if this is science, it is aligned with a pre-Galilean approach to science.

To conclude his presentation, Dant returned to Husserl to reiterate the point that science has become progressively more abstract and dependent on a method that requires specialised knowledge to engage with it. Modern science, Dant said, is an objective, abstract and mathematical method that doesn't lend itself to display in a modern museum. Our museums shouldn't strive to show us 'science', they should concentrate on the traces of science in the form of technology and artefacts whose design has been influenced by science. They should focus on what they do best which is to allow us proximity to the material artefacts that have shaped our lives and the lives of those who have come before us.

Session 2: The Rise of Informality

The second session of the workshop, entitled 'The Rise of Informality', was introduced by Professor Helen Weinstein. She introduced the first speaker, Gordon Fyfe, Honorary Senior Lecturer Research Fellow at the University of Keele University, whose presentation was called 'On the Historical Sociology of Museums: an Eliasian Perspective.'

Gordon Fyfe (University of Keele): On the Historical Sociology of Museums: an Eliasian Perspective

Fyfe opened his presentation with a statement that established his paper as one that would focus on the rise of informality in both society and the museum space. He added that he wanted to open

up a discussion about what formality and informality are and from the perspective of historical sociology. This would be executed through some consideration of the work of work of German sociologist, Norbert Elias.

Fyfe stated that over the past few decades museums have acquired significance as a sociological topic. He also pointed out that certain thinkers' works have also been incorporated into museum studies, such as Pierre Bourdieu and Michel Foucault. Although Elias never wrote about museums, Fyfe argued that his potential contribution to museum studies has been overlooked. Fyfe then drew attention to Elias' publication The Civilizing Process (1939) and identified it as a historical sociology of manners. In it he aimed to convey the social origin of manners and formality that came to pervade the 19th century European bourgeoisie. Drawing on a well-formed argument that is found in the social sciences, he spoke about the idea that 20th century modernity was linked to a heightened body awareness or rationalisation of the body. He then suggested that Elias, writing a generation before Bourdieu and Foucault, was a key figure in developing such ideas.

At this point Fyfe showed the delegates a cartoon frame drawn by the artist Posy Simmonds from 1979. The cartoon depicted a noisy child being admonished in an art museum. This illustrated a historical moment when art museum etiquette demanded formalities such as silence. This image

functioned in the presentation as a marker of a key shift towards a 'new museology'. Fyfe described this new museology as being far more engaged with the visitor and that less emphasis was being placed on the curated object. Using this image as a springboard, Fyfe spoke about the various ways one can approach the subject of formality and that one of the things he felt needed to be discussed was the historical nature of the transition from formality to informality, specifically within the museum.

Fyfe asserted that through using Elias' writings he wanted to show that this transition is not a regression towards barbarism but an intensification of civilization. What is happening is not a loss of control but a ratcheting up, or further refining of control. Elias, Fyfe said, effectively historicised psychology, specifically Freud, in his book The Civilizing Process. He did so by linking Freud's theory of the personality as a stratified series of layers to the central tenets of classical sociology. This meant that he had taken what we might call our 'second nature', or 'habitus' as Elias called it, and taken it seriously enough to produce a history of the body that resonated with sociology. For Elias, Fyfe said, behaviours such as spitting, defecating, urinating and killing are always considered in relation to the socio-historical character of bodily impulses. In this text Elias is providing a documentary history of manners dating back to the Middle Ages. He shows how control over bodily functions has been intensified, finessed and formalised in ways that permit a growing sense of the psychological distance between individuals. What he is doing is treating this as a historical process which can only be analytically separated from changes in the social structure. By changing the social structure you transform 'the habitus'.

Fyfe then moved on to discuss how this relates to social structure. He did this by drawing on the three aspects of Elias' argument which relate to social changes in Western Europe from the Middle Ages. These are:

Monopolies of Power: The formation of the modern nation state as a monopoly of violence with a capacity to suppress violence from competitors provides a platform for gradual formation of a cultural state (e.g. national museums). A notion that Fyfe pointed out is a critical extension of Max Weber's sociology of power.

Interdependence: The growing complexity of the division of labour being associated with the development of the state and commercialisation as Europe develops towns, cities, trade, monetisation and globalisation. Elias' argument is that the division of labour places a premium on self-restraint. As a society becomes more complex there is as Elias expressed it: 'a social constraint towards self-constraint' so that bodily conduct is transformed and 'rationalized'.

Established & Outsiders: Prevailing definitions of the civilized body (manners, formality etc.) express power ratios and fluctuations of established/outsider relations. An established social group may project its ideal mode of living the body, whilst stigmatizing the habitus of outsiders (relevance for studies of the historical development of museum visitor experiences).

Formality versus informality? The problem that Elias and his interpreters faced from the 1960s, Fyfe stated, was how to explain the kinds of informality which begin to pervade social life in the second half of the 20th century. What Elias and a group of Dutch scholars (especially Cas Wouters) begin to address is the possibility that the kind of informality that is evident between parents and children in this period expresses not so much an abandonment of control but elaborations of new levels of control. Fyfe then gave Wouters' example of a parent refusing to smack their child for misbehaving. Instead of identifying this as a loss of control through disregarding their child's lack of civilized behaviour, Elias would identify this as the civilizing process penetrating further into the psyche. In the process of not hitting the child, the parent is opening their own psyche up to further levels of reflection, analysis and therefore informality. The process of civilizing, Fyfe stated, only looks superficially to be eroding when in reality it is being refined.

To conclude his presentation Fyfe discussed how this relates to the museum. One can find from the 1970s, he said, a growing sense that there has been a relaxation of the boundaries pertaining to the classification systems within museums. He then cited the Victoria and Albert Museum's 1975 Pack Age exhibition that focussed on the growing interest and permeating of low brow and popular culture into museums. These boundaries, he said, also extend to the visitor'suser's navigation of a museum space. Citing the 1951 Festival of Britain exhibition, Fyfe mentioned that there was a predetermined route, often determined by chronology, each visitor could take. More recently there has been a shift towards This moved steadily toward curatorial choices being based upon thematic choices which offered the visitor much more agency in interpreting the exhibitions. He then cited the Tate Britain's 2012 exhibition Migrations as an example which invited the visitor to navigate and interpret the exhibition for themselves. The Migrations exhibition was also interesting, Fyfe stated, because the deconstruction of traditional exhibition curation was mirrored in the exhibition's content. The art included in Migrations deconstructed notions of British identity and the different ways one can enter

into the British social identity. Fyfe ended by suggesting that the delegates take the complexities of formality and informality seriously.

Graham Black (Nottingham Trent University): Developing Museum Displays in the 'Age of Participation'

The next speaker was Graham Black from Nottingham Trent University. His presentation was entitled 'Developing Museum Displays in the 'Age of Participation''.

Black began by quoting Kathleen MacLean, a leading figure in the development of science and technology exhibitions in the USA. In 2007 she wrote:

> ... a concern I reluctantly have been entertaining… that museum exhibitions might be an obsolete medium, out on the dying limb of an evolutionary tree, and unless they significantly adapt to their rapidly changing environments in the coming years, they could be headed toward extinction.

Black responded to this by stating that he feels the problem is much more serious. It is not just exhibitions that need to adapt, he said, but museums as a whole. He linked the reason for this current issue to the rise of Web 2.0 and the changing nature of audience engagement. People who visit museums, he said, have always sought an overlapping mix of three different experiences. He quoted Charles Leadbeater's *The Art of With* (2009) in listing three forms of cultural engagement:

- Enjoy: To enjoy being entertained and served; to watch, listen, read. Inside their heads, such people enjoy experiences that can be intensely engaging.
- Talk: Experiences in which the content provides a focal point for socialising and interacting. The value lies in part in the talk that the content sets off.
- Do: Some people also want experiences that allow them to be creative, to get involved, to contribute.

Black asserted that museums will have to acknowledge that visitors are becoming increasingly interested in the active experience and will therefore have to move away from a passive model of engagement. He then offered contextual information about the lifespan of an exhibition. It will take

five years to plan and complete an exhibition and it will then need to remain relevant for another ten. This means museums need to work profoundly differently to create much more participatory, museum experiences that have the potential to lead to long-term relationships between museums and their users, both on-site and online.

The result is that some museums are identifying the need to change and the opportunity presented for developing greater relationships with their visitors. Black noted that these responsive museums are adapting by moving from static exhibits and websites to dynamic environments, as well as moving from interactive exhibits to participative exhibits. They are deconstructing traditional boundaries that exist between museum and visitor to draw from people's experiences and work with them. This, in return, is leading slowly to the development of a multi-platform museum experience based around participation. The real challenge, Black asserted, was not whether museums should do this but how well can they do it.

Black moved on to speak about the importance of museums generating discussion with their users. Conversation leads to social learning, he said, and it is also the basis for dialogue with the museum and therefore provides a way for visitors to better understand and contribute to the communities and the world in which they live. These experiences can be intensely engaging. He then recommended two books that deal with this subject: Nina Simon's *The Participatory Museum* (2010) and his own book, *Transforming museums in the 21st century* (2012).

Black then moved on to speak about participative and interactive exhibits. Linking back to Tim Dant's presentation and his discussion of MOSI, Black defined MOSI's *Xperiment Gallery* as an interactive exhibit in which the user is actively involved but the museum remains in control of the outcome. By contrast to this, participative exhibits are open-ended and outcomes are often outside the museum's direct control.

The next subject that Black spoke about was crowdsourcing. This is about recognising and appreciating the expertise that audiences can bring to a project and museum. These projects, he said, are doubly productive as they give museum users satisfying and interesting tasks to do and can strengthen community links, while the end product can be highly beneficial. Through looking at Mia Ridge's research into crowdsourcing Black examined the motivations of participants in relation to these activities. It showed that participation is driven by pleasure and passion for the subject, not profit, and that some do contribute hugely while others, referred to as 'drive-bys' do a little. This inspired Black to think to consider the nature of invitation and how we can encourage people to participate.

The next subject that Black spoke about was user-contribution and user-generated content. Citing examples such as *Clore Interactive Gallery* at Manchester Art Gallery he stated that in most cases,

participative exhibits and crowdsourcing pose no threat to a museum's authority. As a counter to this he acknowledged that a similar exhibition in Sheffield had established a 'Family Tree' which asked participants 'If you could go back in time and meet any member of your family, what would you say?' had resulted in certain comments that were particularly emotive. This illustrated that something seemingly trivial can generate depth of response and that museums must take audiences seriously.

Black then addressed the barriers that prevent museums from stimulating user-generated content. From the perspective of the museum there can be a sense that it is a threat to its authority, a fear that user content could potentially generate controversy or may include inaccuracies. There are also anxieties about operational issues about how one curates or manages user-generated material. Barriers that the public face in the museum include a lack of opportunity to observe others participating first, they can feel intimidated or fear embarrassing themselves. There are pathways to facilitate user engagement at varying levels and often the museum doesn't provide these. Black observed that the results of Museums Association's latest survey into *Public perceptions of – and attitudes to – the purposes of museums in society* (Britain Thinks, 2013) had been issued in the same week as this workshop. Noting that their findings suggested that people "consistently agreed that museums were not appropriate environments in which to hold controversial debates", Black felt that museums, through the development of exhibits and programming that supports dialogue, are actually amongst the few places that can do this!

The hugely positive impact of including user-generated content, he said, is that it is immediate and relevant. It converts the contributor into an active participant, stimulates reflective conversation and diversifies content and the range of voices found in the museum. It decreases the power of the museum as gatekeeper and it shows the value the museum places for drawing on, and developing, the expertise and opinions of its users. User generated content, he said, should be a constant element in museums and will become one because of user demand for it.

The next aspect he commented on was the practice of co-curation. He firstly spoke about the advantages of co-curated projects, identifying that they challenge the parameters of the museum and its willingness to take risks, upskills museum personnel and requires the museum to come up with different ways of interpreting material. For the communities involved it allows them to have

agency over their stories. It provides alternative ways of looking at objects and values those involved and the expertise they can bring.

Despite this, Black acknowledged that many issues arise from co-curation. As well as it being costly, we have to ask, he said, who is it for and who decides on the participants? Issues of agency and focus arise when one starts to examine the nature of co-curative practices. He suggested that those interested in co-curation in relation to issues of authority, read Bernadette Lynch's *Whose Cake Is It Anyway?* (2009).

To conclude his presentation Black said that museums need to adapt to a changing participatory culture. The world is changing, he said, and users will decide their own levels of involvement but museums must facilitate this. If museums do adapt in the right ways this will lead to more meaningful relationships with users.

Comment: Jean-Baptiste Gouyon (University of Kent): Co-curation as Boundary Work

The next speaker was Jean-Baptiste Gouyon, Research Associate at the School of History, University of Kent, formerly, Research Associate at The Science Museum.

Gouyon began his presentation by explaining that he felt that it would be useful to examine co-curation as this has been one of the key categories to emerge from the three workshops, particularly the York meeting. He outlined that his presentation would argue the case for co-curation from the perspective of the sociology of scientific knowledge. The then spoke about the next session, saying that the following presentations from Merel Van der Vaart, Helen Peavitt and Kathleen McIlvenna, would identify co-curation, in the production process of a museum exhibition, as the enrolment of members of a potential audience for this display.

The basic underlying idea, he said, is that on any given topic, owing to their experience, some members of the public will be repositories of knowledge. This knowledge, once accessed by curators, can then enrich the planned exhibition if these members of the public are associated to the production of the work. Gouyon then gave an anecdote that Dr Tim Boon had told him, that he felt crystallised the idea and motivations behind co-curation. A family, he said, was visiting the *Making the Modern World* gallery at the Science Museum and the father, when in front of the V-2

missile, began telling his children about his childhood at Croydon, during the Second World War. Croydon, Gouyon noted, was then the site of London airport and the target of several V-2 launches. The rocket thus came to occupy a prominent place in the lived experience of Croydon's inhabitants as a threat to their existence, but also as an advanced technological artefact that encapsulated some of the most pressing techno-political issues of the time.

Through this process of telling his childhood stories the visitor was ascribing the artefact with more significance than is usually possible with historical objects. The man was adding further layers of meaning as well other ways for his audience to relate to the artefact than the accompanying labels and supplementary video could. The father situated the artefact temporally and spatially as an object whose cultural significance was not only that it had been the first significant step towards space travel, but also as a cause for fear and anxiety.

Gouyon then reflected on the kind of object that the V-2 has become through being displayed in a museum dedicated to science and technology. He said that it is an object that is intended to convey knowledge about the history of technology in relation to the modern world. Gouyon cited sociologist Karin Knorr-Cetina's statement that knowledge objects are characterised by "an unfolding ontology." Using this idea he stressed her point that artefacts are in fact open to the process of thought and projection, rather than being definitive objects. The more diverse the perspectives that are brought to bear upon an artefact results in a deeper and more complex opening up of the object.

Gouyon then moved on to reflect on what Bruno Latour in his text *Pandora's Hope* (1999) felt was the supposed dichotomy between realism and constructivism regarding knowledge production. Latour, he said, proposed that the more constructed a fact, the more real it becomes. In producing knowledge about something, we articulate propositions about it, Gouyon said, and as the number of propositions increases, so does knowledge. He expressed that if there is a greater network of people contributing propositions then the knowledge produced will become stronger. A way of theorising

science in public contexts, he said, is to see it as an instance of the connection of the knowledge produced by academic scientists to the social totality, through the creation of opportunities for non-scientists to articulate propositions about knowledge objects and having them connected to propositions articulated by scientists. A phrase for this in the museum context, Gouyon proposed, would be 'co-curation'.

Gouyon then considered co-curation from the perspective of what one can call institutional politics. Self-consciously

echoing Gooday's introduction, Gouyon spoke about the growing trend of co-curation becoming more prominent at a time when museums, specifically those dealing with science and technology, are working to redefine themselves and how they relate to audiences. Schematically, there are two poles. Gouyon outlined that at one end there is a vision of the museum as dispensing rational entertainment to a passive audience. At the other end the museum is envisioned as a tool for producing knowledge, in the context of an artefact-based, materialist history of science and technology. The museum is remarkable in this respect because it is a public building and therefore it is a tool for both academics and visitors. Gouyon identified that through this view of the museum, audiences are identified as potential participants in the production of knowledge who will in turn help others to produce knowledge based on collections. Gouyon then argued that according to these distinctions, co-curation could be analysed as a technique devised by advocates to forward and defend the view that museums are centres of knowledge production. This can then be identified as being involved in what Gouyon referred to as "a kind of boundary work."

Like Graham Black, Gouyon acknowledged that co-curation raises many questions about the certification of knowledge and the role of academics. He used the complex issue of curatorial decisions in relation to co-curation to ask the question 'In a co-curation project, who takes the decisions regarding the display?' If lay participants are not involved, he said, the point of co-curation may be somehow weakened and the authoritative status of the museum reasserted.

Gouyon concluded his presentation by saying that the present workshop is evidence that co-curation is duly interrogated. He hoped that the coming papers will exemplify the way co-curation can be a means of rethinking the social and institutional identity of museums of science and technology. He finished by saying through co-curation, museums can reinvent themselves as facilitators for knowledge production structured upon an artefact-based history of science and technology. This kind of museum-centred discipline has the potential to connect the knowledge it produces to the lived experiences of the museum's visitors by involving them in the two related processes of

Session Three: Public History of STEM in Action: The Science Museum Experiments

The third session of the workshop was chaired by Jean-Baptiste Gouyon and was entitled 'Public History of STEM in Action: The Science Museum Experiments.' The first speaker was Merel Van der Vaart, PhD researcher with the University of Amsterdam and Allard Pierson Museum. Her presentation was called 'The Challenges of Engaging Enthusiasts Online: Using Social Media as a Tool for Dialogue and Knowledge Sharing.'

Merel van der Vaart (University of Amsterdam): The Challenges of Engaging Enthusiasts Online: Using Social Media as a Tool for Dialogue and Knowledge Sharing

Van der Vaart began her presentation by explaining that she would be focussing on one of the projects that she worked on during her time at The Science Museum. This was a small exhibition about the history of electronic music entitled 'Oramics to Electronica: Revealing Histories of Electronic Music.' This exhibition celebrated the recent acquisition of an early proto-synthesiser called the Oramics Machine, which had been developed by Daphne Oram in the 1960s and 70s, whilst also looking at the wider history of electronic music in the UK.

Van der Vaart explained that part of the development of this exhibition focussed on exploring new ways to engage people with the history of electronic music and the exhibition-making process. One of the audiences they wanted to work with was that of electronic music enthusiasts. Van der Vaart said that there were several reasons for doing this. The most important reason, she cited, was that the museum wanted to open up their exhibition-making practice in order to engage with audiences that might offer different approaches to the material than those that the museum might traditionally take. They also wanted to give others the opportunity to engage with and contribute to the work that was being done in the museum. The motivation to broaden their reach and give more people the opportunity to engage with the project resulted in the creation of a Facebook page and a remix competition. Unsure of how popular either would be, their goal, Van der Vaart said, was to better understand the ability of online formats in engaging people with their work and collections.

Van der Vaart then spoke specifically about their utilising of social media, specifically Facebook. Rather than creating a Facebook page for the exhibition, the museum decided to set up a page for the Oramics Machine. Their reasoning for this was based on the hope that it would provide the opportunity to use a less formal register. Van der Vaart observed that this may have resulted in creating a barrier for attracting participants. A page called 'Oramics Machine', she said, would draw less attention than for a page entitled 'Electronic Music Exhibition'. However, in her opinion this didn't make the project less successful. The title spoke to the specialist audience that they wanted to reach and this helped develop the community of electronic music enthusiasts they were aiming for. Talking about the popularity of the Facebook page, Van der Vaart quoted the number of likes the page received but she also asserted that although Facebook can generate detailed metadata it says little about whether people engage with your content or not. Van der Vaart then moved on to talk about how the museum used the Facebook page and how people responded to it.

The Facebook page was utilised to open up the exhibition-making process to the public through sharing pictures of the co-creation workshops and visits to the stores. Pictures generally work well on Facebook, she noted, and sharing the process and progress in this way meant they could generate excitement about the exhibition whilst being transparent and open about the exhibition's scale. A team of twelve electronic music enthusiasts who co-created a large part of the exhibition were encouraged to write blog posts about their co-creation experience. They published these on their own blogs and the museum linked to them from the Facebook page. This provided great content for the museum to share and it meant the participants could grow the readership of their blogs. The blogs also offered the museum a way of charting the participant's experience of the workshops they organised for them and the questions they asked themselves.

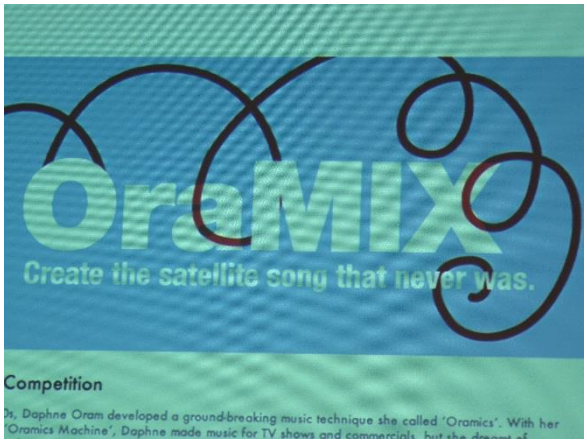
The Facebook page also became a means by which the museum could open up the discussions that arose during the co-creation workshop to The Science Museum Facebook followers. This meant the museum could acknowledge their expertise and give them an idea of the kind of questions the exhibition team were dealing with, and in one case it led to the museum successfully sourcing the loan of objects for the exhibition.

After the exhibition opened, visitors were encouraged to share their pictures and experiences of their visit online. Many of these responses were positive, but Van der Vaart also pointed out that some were critical. She then went on to discuss the complex etiquette of social media. The museum

learnt that it's best to take time to craft an honest and open answer to criticisms and queries. Her experience, she said, was that the people who post negative comments actually care a lot about what you're doing and it's important to acknowledge the criticisms and take time to respond to their concerns.

Van der Vaart moved on to speak about knowledge-sharing. Besides opening up the exhibition making process, the museum also wanted to create a space for knowledge-sharing. Over a period of several months three volunteers researched objects that weren't on display in the exhibition and wrote blog posts about them. The museum also shared content from their archives that was directly relevant to the enthusiasts.

Van der Vaart commented that she was most enthused when the participants generated independent outcomes. For example, somebody posted a comment that started with an enthusiastic review, but also included a question about some technical details regarding the Oramics Machine. Although Van der Vaart didn't have an answer due to the specialised nature of the question, the comment received a response from the engineer who built the prototype of the Oramics Machine for Oram. This led to a continued technical conversation that, although facilitated by the project's Facebook group, had little to do with the museum.



She stated that they couldn't have grown this community of enthusiasts without Facebook, but using the services of an external party also means you can't control the way these services evolve. Since they started the Facebook page, the layout and archiving features of the page changed. Comments made by others are no longer placed among their own content, but in a separate little box at the top. Facebook's move towards being a more traditional marketing tool is limiting if you value content from others as much as, or more than, the content you've created yourself.

As many of the enthusiasts that were involved were musicians or DJs themselves, the project also established a remixing competition to offer them the opportunity to engage with historical content in a creative way. Working together with Soundcloud (https://soundcloud.com/), the project used their platform to run the competition. They also teamed up with the Daphne Oram Trust and record label Boomkat, who together managed the rights to Daphe's work, providing samples of Daphne's experimentation with the Oramics Machine. The competition was promoted through the music magazines *The Wire* and *Sound and Music.* The judging panel comprised of Brian Eno, DJ Spooky and

an editor from *The Wire.* Although prizes were distributed, Van der Vaart felt that most people joined the competition because of their interest in the content. She then spoke about the complexity of the practical organisation of the competition. This included issues relating to communication with the audience due to the online format no longer being Facebook. Other platform issues arose, such as the scoring system which although unused, couldn't be turned off and made the participants uncomfortable. Another concern were the terms and conditions of the competition, which were quite strict due to the copyrighting of Oram's work: people were only allowed to use the samples provided for the competition and couldn't distribute their own remixes elsewhere.

To conclude her presentation Van der Vaart reflected on what was learnt from this experience. She acknowledged that trying to engage people online isn't easy but that it pays off and that red tape is never an excuse to not be open to the enthusiasm and knowledge of people outside your organisation. Although this progressive approach can cause anxiety, she felt it is a worthwhile endeavour. She went on to say that when you're open with people about the way you work as an organisation and you are willing to share not just what's meaningful to you, but also what's meaningful to them, people will share unexpected and great things with you too.

Helen Peavitt (Science Museum) and Kathleen McIlvenna (Royal Armouries): Reflections on the Enfield Exchange Project

The next speakers in this session were Helen Peavitt, Curator of Consumer Technology at The Science Museum, and Kathleen McIlvenna, PhD candidate at the Institute of Historical Research, University of London, and Curatorial Assistant of Tower Collections at the Royal Armouries, formerly Museum Assistant at Enfield Museum Service. The title of their presentation was 'Reflections on the Enfield Exchange Project' and it charted the development, the challenges and the outcomes of the Enfield Exchange Project.

McIlvenna began by explaining that the two speakers would represent the two sides of an AHRC-funded initiative led by The Science Museum in collaboration with Enfield Museum Service. The intention of this initiative was to establish meaningful relationships with various community groups by focussing the project upon an artefact pertaining to Enfield's

technological history.

Peavitt then spoke about the genesis of the project and its emergence being linked to the museum's public history remit which aims to take objects from the collection and make them more accessible and more meaningful to a variety of audiences – community groups, lay specialists, telecommunication enthusiasts and women who had experienced working with the manual exchange unit. Their application to the AHRC's Connected Communities fund was strengthened, Peavitt noted, because they already had a well preserved artefact, archival images dating throughout its usage, and connections with Enfield Museum and local studies groups.

McIlvenna and her manager had previous experience working at The Science Museum and she noted that the familiarity between the institutions meant that the initial stages of the project ran smoothly. Emphasizing a sense of the open and honest practice that is crucial in collaborative work, she stated that the Enfield Museum Services made clear their limitations on staff and time from the outset. Despite this limitation Enfield Museum were able to share with The Science Museum their contacts with local study groups, press and media. McIlvenna then highlighted that the link with a national museum resulted not only in working experience but in practical experience regarding paperwork relating to the loan of the artefact.

Information about the location of the exhibition, the Dugdale Centre, was given and slides were shown. The Dugdale Centre is an established and frequented community building that incorporates a temporary exhibition space, theatre, and café. Peavitt spoke about how the process of installation was remarkably quick, approximately one hour fifteen minutes, although there were concerns about placing such a sizeable and possibly imposing object in a relatively contained space. McIlvenna said that this added to the visitor and staff appreciation of the object. Instead of being imposing it was received as visually arresting and inherently interesting. The manual exchange unit was also supported by accompanying displays and contextual information drawn from archives across Enfield Museum, The Science Museum and BT Heritage. McIlvenna then added that the use of their collections was crucial in making Enfield Museum feel integral to the project and not just a passive facilitator.

Other aspects of the exhibition included a website and Facebook Page to promote interest and dialogue with users. Listings of events, workshops, and blogs featured on these online platforms.

Peavitt then moved on to discuss some of the challenges faced during the project. They were conscious that they had a generic artefact, but also identified that its potential to engage the Enfield audience lay in its significance to the history of the community. She acknowledged that this had mixed responses and failed to reach certain community groups, specifically the local history groups. This, she said, was due to the groups having schedules planned far ahead, as well as their own funding to carry out their own projects. This was identified as a key learning experience for the museums as they realised that in order to engage with the local history groups contact has to be made early on and the partnership work embedded in the planning for all the organizations.

McIlvenna added that they faced certain challenges regarding the location of the exhibition. Although there were many positives to the location, such as an established base of visitors and proximity to the artefact's origin, it did actually make it hard to brand it as an Enfield Museum exhibition. The absence of a dedicated Enfield Museum Services site resulted in users not necessarily identifying the exhibition with their service. She said this would be something that Enfield will consider in the future and that they will aim to develop more face-to-face interaction between staff and visitors. The visitors' desire to talk and share their knowledge and experience sometimes went unheard or uncharted because of the limitations and restrictions faced by a museum staff that isn't based at that location. In hindsight they felt this could have been remedied slightly by more drop-in sessions and workshops. Peavitt then spoke about their initial aim to empower community groups to understand and engage with the material culture of their heritage. She cited the engagement of women who had previously worked on the machines with an artefact which signified their own lived history. She also noted that it had not been easy to achieve this as many of the ex-telecommunication workers didn't necessarily identify that their experiences and knowledge were valuable and relevant.

Despite these issues the speakers felt that the project was a success. To conclude the presentation they elaborated on some of these successes. The target audience was found, oral histories were collated, and a wide range of demographics were brought together through their events. McIlvenna felt that this was partly due to the location of the exhibition and expressed that the use of local press

and media is crucial in publicising projects. Talking from the point of view of a local museum, McIlvenna said that collaborative projects like this are empowering. They offer experiences, skills and relationships that can generate further involvement and confidence when approaching larger museums for future collaborations. The presentation ended with the screening of an interview with an oral history subject called Joyce Barnard, who worked at Enfield and other telephone exchanges in the late 50s and early 60s, talking about her career.

Panel: Is Science a Special Case?

The final session of the day was concluded with a panel of speakers responding to the workshop and focussing on the question of whether science is a special case in museology. Professor Ludmilla Jordanova, presently Chair in Modern History at King's College London, was unable to attend the workshop so Dr Anna Maerker, Senior Lecturer in History of Medicine at King's College London, chaired the panel.

Dr Stephen Johnston (University of Oxford)

The first respondent on the panel was Dr Stephen Johnston, Acting Director of the Museum of the History of Science, University of Oxford.

Johnston began by saying that he felt the mix between programmatic papers and case studies was particularly positive and successful. From here he referred back to Tim Boon's triangular model of the university, the museum, and the lay audience. He related this to his own status as practitioner within a university museum by saying that he "collapse[s] two parts of the triangle together". He also added that because of the ease of access and wealth of material online, he increasingly feels like a lay audience member as he isn't bound by the same disciplinary boundaries he faced earlier in his career, particularly during research stages. The increasing possibilities of online learning and knowledge transfer means that we all able to identify as a lay audience as well as becoming more expert simultaneously as we navigate it. The triangle, he said, is contracting into a dot.

He then moved on to list and comment on topics that were presented throughout the day. These included relevance, co-curation, participation and exhibiting. Firstly, he spoke about the idea that

museums have to present relevant material that is pertinent to the daily life of visitors. He felt that just having relevance as a criteria was worrying because it restricted user engagement. The less relevant an exhibition is to an audience, the more the museum can expand the user's experience and knowledge.

He then spoke about being struck by the candid comments at the end of the Enfield case study. The reason for this was that the co-curation was enacted between institutions. This, he felt, had always been part of museums' existence. He cited science museums as an example of museums that have corresponded with scientists, engineers and industry specialists to build on an external knowledge. It is maybe necessary, he suggested, that we expand and broaden what our definition of public co-curation is.

Johnston then spoke briefly about participation and referred to Graham Black's presentation as inspiring and stimulating. He picked up on Black's comment about planning exhibitions that will be relevant in ten years time and applied it to Merel Van der Vaart's observations about the problematic nature of using Facebook as an online platform for engagement. He then interrogated the function of Facebook and stated that maybe using a platform that isn't tailored to the museum's values is an approach to be wary of.

He concluded his response by returning to the example of MOSI to consider the elements that make up the intellectual and experiential parts of an exhibition. Through making reference to a slide that showed a timeline on a wall he articulate the necessity for curators to be conscious of the architecture of the museum space. If you make an exhibition that feels like a corridor, he said, the audience will treat it as one. We need to be conscious of architectural constraints when developing exhibitions.

Jack Kirby (Museum of Science and Industry, Manchester)

The next respondent was Jack Kirby, Head of Collections at MOSI, the Museum of Science and Industry, Manchester.

Kirby began by immediately addressing the brief to suggest that if science is a special case in museology then it is self-generated, and we then need to ask whether science is seen as a special case in society as a whole. In asking this Kirby highlighted the different views that the public hold, regarding the image of science "as boring" and the image of scientists "as engaging". The separation

between the two, he said, is not a new thing. This is partly because the material culture of pure science, he said, is extremely challenging to make engaging.

Kirby suggested that a way of countering this and generating user engagement is to convey what historical artefacts and experiments mean to an audience. But like Johnston, Kirby said it doesn't necessarily have to be restricted by being relevant to today.

Kirby then moved on to point out that learning theory hadn't been discussed greatly during the PHoSTEM workshops. By utilising constructivist learning theories that suggest that people learn by what they already know museums can also generate user interest. People build on what they already know, he said, so if a visitor doesn't have a hook into an exhibition they will struggle to make sense of it.

All of this means that museums have to approach collections with greater depth than solely identifying how a technology worked. He acknowledged that this is often a tendency with museums and it is not always the point. Contextual information about how the technology relates to society and culture beyond its composite structure is often the way to engage audiences.

Kirby followed this by addressing the problems that de-industrialisation creates. He spoke about the commemorative nature of a post-war museum culture that acquired certain artefacts which is now struggling to generate engagement because the generation that have experience with or knowledge of the machinery are dying. Although this is happening there is still a prominent amount of science going on in ex-industrial cities such as Birmingham and Manchester. He then spoke about MOSI's aim to tell the story of Manchester as a city where science and industry combined to influence developments in the modern world and our lives. This, he felt, was a very powerful narrative and MOSI's collections, although disparate, fit into that narrative.

Kirby concluded his response by engaging with the topic of public history and co-curation. He felt that by considering science and technological objects as part of a wider culture we can tease out different meanings and significance from them. He cited the Enfield Exchange Project as a particularly good example of how much social and cultural meaning can be found in a seemingly mundane object. His own experience, he said, has shown him that if you ask participants to respond to an artefact, no matter their level of education, background, ability or disability, they will find something that engages them.

Kirby finished by stating that through all these different techniques we can engage audiences with even the most difficult science collections by considering them as part of culture, rather than identifying them as 'other'.

Rebekah Higgitt (National Maritime Museum, Greenwich)

The final respondent on the panel was Rebekah Higgitt, Curator of the History of Science and Technology at the Royal Observatory and National Maritime Museum, Greenwich.

Higgitt began by noting the prevalence of technology in the case studies that demonstrated practices which successfully engaged audiences. She noted that it seemed pertinent that these technologies were functioning and operating within living memory. It was suggested that the element of nostalgia was integral to audience participation and because of their familiarity with the technology, some of the more engaging practices such as oral histories could be carried out.

Higgitt identified that this in turn presents a question about how museums deal with the many other objects in their collections that don't immediately generate the same connections with audiences.

If we want this kind of public and participatory approach to the way museums present science, she said, then we need to stretch our definitions of science and what we present. Some of the suggestions that she proposed museum practitioners think about included citizen science and popular science. Museums should also think about the wider political discussions that surround science, such as where funding for technology comes from and the relationship that this has to society. This, she said, is just one way of making exhibitions speak to contemporary concerns although it doesn't just have to be about the present moment, as Stephen Johnston had previously said. By looking at a world where some of the boundaries between who produces and who consumes science, who is expert and who is lay, who funds and who receives money, you can often see a blurring of the boundaries. It is here that Higgitt identifies an opportunity to use historical narratives to explain controversies, and are also relatable to contemporary issues. Higgitt then suggested that museums can move away from the idea that science museums are only there to teach the content of science and towards fostering audience understanding of the way that science effects their lives.

Museums need to be thinking about technology in relation to the significance to local or social histories. Museums often think that the experience of science must be modern, relevant, educative, interactive, and that it must be teaching a positive story overall, even when dealing with aspects that

are controversial. Science, in Higgitt's view, should be for grown-ups as well as kids; it should be about history and not purely focused on modern 'relevance'; and could be challenging and negative rather than relentlessly looking for the positive. Higgitt concluded her response by stating that science and technology museums can challenge the assumptions about their practices by utilising more participatory and engaging methodologies.

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