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BEYOND DISSEMINATION — SCIENCE COMMUNICATION AS IMPACT

Ships, Clocks & Stars: the quest for impact

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Abstract

Between 2010 and July 2015, a group of researchers at the Department of History and Philosophy of Science, University of Cambridge and the National Maritime Museum were engaged in an Arts & Humanities Research Council-funded project "The Board of Longitude 1714–1828: Science, innovation and empire in the Georgian world". The project team included a dedicated Public Engagement Officer whose role was to engage audiences with the outputs of the research project.
The National Maritime Museum celebrated the 300th anniversary of the 1714 Longitude Act with a major exhibition, Ships, Clocks & Stars: The Quest for Longitude, which told the story of the 18th century quest for longitude, alongside a series of longitude-themed events. To commemorate the same anniversary, NESTA launched the 2014 Longitude Prize, a challenge to find a solution to today's equivalent of the longitude problem, with the problem chosen by a public vote. Using these two examples as a case study, I explore how history of science helps science communication organisations engage people with science, and vice versa.

Keywords

Public engagment with science and technology; Public understanding of science and technology; Science centres and museums

Between 2010 and July 2015, a group of researchers at the Department of History and Philosophy of Science, University of Cambridge and the National Maritime Museum were engaged in an Arts & Humanities Research Council-funded project "The Board of Longitude 1714–1828: Science, innovation and empire in the Georgian world". The close partnership between a leading university department and a national museum enabled a number of significant outputs to be delivered to a range of audiences. This was achieved through the exploitation of the project's findings in outputs delivered at or produced by the National Maritime Museum (NMM). To do so, I was appointed as Public Engagement Officer dedicated to engaging audiences with the research.

The National Maritime Museum (NMM) sits within Royal Museums Greenwich, which also includes the Royal Observatory (ROG) and Queen's House. As the Royal Observatory was founded in the 17th century, with the explicit purpose of helping solve the problem of finding longitude at sea, the *Ships, Clocks & Stars* temporary exhibition at the NMM in particular provided a unique opportunity to bring these two sites together.

The NMM therefore provided an ideal location from which to disseminate the project through displays, temporary exhibitions and related activities. These include a well-established and successful learning programme offering activities for formal and informal learners, and access to the Museum's collections and research for users worldwide through publications, media coverage and web resources. I joined the project in its last full year, 2014. By that time, much of the research had been done, the *Ships, Clocks & Stars* exhibition was due to open in a few months and the companion volume co-authored by the project's Co-Investigators had gone to the printers.

The project as a whole was intended to look at the history of the Board of Longitude more broadly. By the time I joined, more specific outputs of the research had become clear, which informed the learning outcomes of the engagement activities. In very simple terms they were:

1. Finding a solution to the problem of finding longitude at sea was an important political-scientific issue in the 18th century
2. There was no such thing as the Longitude 'Prize'
3. The portrayal of John Harrison as the 'lone genius who solved the greatest scientific problem of his time', is only part of a much broader story [Sobel, 1995].

The anticipated engagement strategies fell into five key areas:

Exhibitions and displays. The project informed four temporary exhibitions across Royal Museums Greenwich: *Stars to Satellites* and *Longitude Punk'd* at the ROG, *The Art & Science of Exploration* at The Queen's House and *Ships, Clocks & Stars: The Quest for Longitude* at the National Maritime Museum. The project also fed into longer-term display plans at the ROG, where the Harrison timekeepers are displayed.

Learning activities. Exhibitions and displays can only cover so much of the rich historical content to come out of such a research project. Face to face learning and live interpretation offer additional ways of engaging audiences and delivering learning outcomes. The project findings offered rich material for the programme of lifelong learning activities the NMM offers. These included lectures, gallery tours, study days and LATE events, which are large-scale social learning evening events for adults. The most successful events in terms of attendance were either very specialist, such as the 'Decoding Harrison' horology conference, or very general, such as the 'Dark and Stormy' LATE, which featured a range of activities from live music, craft activities, short talks, curator tours, actor performances and a pub quiz. The Dark & Stormy LATE in July was the Museum's most successful LATE ever, reaching more people than ever before, with half of the visitors visiting for the first time and 97% saying they would visit again.

Publications. As well as the academic publications produced as a result of the project, the exhibition curators produced a companion volume to the exhibition, *Ships, Clocks & Stars: The quest for Longitude*, which drew heavily on the project findings [Royal Museums Greenwich, 2015].

Media coverage. With 2014 marking the 300th anniversary of the Longitude Act, the Museum was well placed to present aspects of the research through press coverage, including broadcast media. This built on the good coverage that the NMM and ROG already achieve. On top of this, the National Maritime Museum was an official partner of Nesta's Longitude Prize 2014.

Online resources. In 2013, the Museum launched an online resource that digitised the archives of the Board of Longitude and related manuscript and printed material from Greenwich and Cambridge (cudl.lib.cam.ac.uk/collections/longitude). The project was funded by Jisc as a partnership between the NMM, Cambridge University Library and the Department of History and Philosophy of Science, Cambridge, our partners in the AHRC-funded Board of Longitude project (www.rmg.co.uk/longitude).

When I took on the role of Public Engagement Officer for the Board of Longitude project, one of the explicit aims of *Ships, Clocks & Stars* and the related learning programme was to use the history of science to engage the contemporary science audience of the ROG, as well as serving the needs of more traditional NMM audiences, which include enthusiasts interested in maritime history and local families looking for activities at the weekends and in school holidays.

History of science can be a useful way of connecting with audiences who would not think of themselves as "interested in science". Equally, the field of science communication also offers something to those attempting to deliver impact agendas as defined by Research Councils UK [Research Councils U.K., 2014]. RCUK defines impact in two ways: academic impact and economic and societal impact. The first is the demonstrable impact that research has on academic advances within and across disciplines. The second, which I was appointed to deliver, is the demonstrable it contribution makes to individuals, organisations and society as a whole.

Despite the increasing role of impact agendas in research council funding bids, research projects often start with the topic rather than the audience. Before any major exhibition at the NMM, we begin with audience research. We may already have an idea about what the topic is, the history of the Board of Longitude in this case, but what shape that exhibition will take and what the content will be is informed by the audience evaluation. This is the process of identifying an appropriate audience for each exhibition, and through a series of focus groups with that audience, identifying the themes and topics that will engage that audience the most. Although the audience evaluation was primarily concerned with exhibition content and design, its findings were invaluable in determining how to approach public engagement around the themes of the *Ships, Clocks & Stars* exhibition.

Ships, Clocks & Stars: The Quest for Longitude opened in July 2014, to commemorate the 300th anniversary of the passing of the first Longitude Act, an anniversary which according to our research was a 'world-changing tercentenary unknown to all but a small minority'. To commemorate the same anniversary, Nesta, formerly the National Endowment for Science, Technology and the Arts, launched the 2014 Longitude Prize, a challenge to find a solution to today's equivalent of the longitude problem. This link between *Ships, Clocks & Stars* and Longitude Prize 2014 helped reinforce the concept that reliably determining one's longitude at sea

was an important issue in eighteenth-century Britain, which was a key message of the research.

Nesta's Longitude Prize 2014 had nothing to do with longitude at sea, however Nesta used the 300th anniversary of the Longitude Act as a way of thinking about what the equivalent of the longitude problem is today. The public were invited to vote for what they saw as the most pressing scientific issue of our day, choosing from antibiotic resistance, dementia care, flight, paralysis, water, food. In the public vote, antibiotic resistance was chosen. The BBC2 Horizon documentary, *The £10 million prize*, connected the 18th century quest for longitude with the six biggest scientific issues of the 21st century [Horizon, 2014]. This reinforced the idea that longitude was an important issue in 1714, and enabled us to bring the longitude story to a new audience.

After the public vote had closed, we at the Museum invited visitors to the exhibition to share their equivalent of the longitude problem and possible solutions, mimicking the eighteenth-century coffee shops where longitude and other scientific and political issues of the day were discussed. The final section of the exhibition was dedicated to the Longitude Prize 2014. After being introduced to the prize itself and the six categories, visitors were invited to leave their responses to the questions, 'What do *you* think is today's equivalent of the 'longitude problem'? How could it be solved?'. At the end of the exhibition, more than 2000 comment cards had been left. For Nesta, linking to the history of the quest for longitude allowed them to position their Longitude Prize 2014 in a longer history of challenge prizes. There was in fact no such thing as the 'Longitude Prize' in 1714, as the Longitude Act of 1714, which the *Ships, Clocks & Stars* exhibition took as its starting point, was in fact a series of rewards rather than strictly a prize. For Nesta's purposes, it worked as a communications strategy that engaged thousands of people.

The differences and similarities between the eighteenth-century quest for longitude and Nesta's Longitude prize 2014, including what exactly the difference between a challenge prize and a series of rewards is, can be a great starting point for allowing audiences to reflect on the relationship between contemporary and historical science. This was done to a small extent through the comment cards in the exhibition. However, for the deeper discussions which cannot be dealt with in any depth in an exhibition, we used a number of different engagement methods. On top of the presence of the Nesta Longitude Prize in the exhibition, there was a BBC *Horizon* documentary and we ran an event at the Museum, between NMM, Royal Society and Nesta, 'Longitude: Back and forth across the years'. This event featured the Astronomer Royal Martin Rees and Rebekah Higgitt, a Co-Investigator on the longitude research project, in conversation about the relationship between the 18th century quest for Longitude and the 2014 Longitude Prize. The event was followed by an in-depth question and answer session with members of the audience. The relationship between the Nesta Longitude Prize and its eighteenth-century counterpart was also a topic of a number of blogs on the Board of Longitude project website (www.rmg.co.uk/longitude).

Returning to our three main messages of the project (see above), the relationship between the National Maritime Museum and Nesta concentrated on the message that finding a solution to the problem of finding longitude at sea was an important

political-scientific issue in the 18th century and that there was no such thing as the Longitude 'Prize'. Our third key message was that the portrayal of John Harrison as the 'lone genius who solved the greatest scientific problem of his time', is only part of a much broader story (see References).

The exhibition was divided into a number of sections, which took a broadly chronological view of the quest for longitude story:

1. The Longitude Problem
2. The Longitude Act of 1714
3. Longitude Solutions
4. Discussion and debate
5. Halley, Meyer and Lunar Distances/Harrison's Timekeepers
6. Longitude on Trial
7. Making longitude work
8. Proof in the Pacific
9. Commerce and creativity
10. The World Defined.

Although historians of science are suspicious of uncomplicated hero worship, the role of people is essential to the history of science. This is seen in the fact that biographies of people like Halley, Newton and Galileo are still both popular and a useful resource for historians of science; useful nodes to think about networks of scientific communities. The most persistent hero narrative of the longitude story is that of John Harrison, the Yorkshire clockmaker. According to the sub-title of Dava Sobel's bestseller, *Longitude*, Harrison was the 'Lone genius who solved the greatest scientific problem of his time'. According to Sobel, Harrison overcame adversity to develop the H4 timekeeper, which provided an accurate way of finding a ship's longitude at sea. Neither the researchers in the project, nor the exhibition team, disputed the contribution Harrison made to the process of finding a reliable method of finding and keeping longitude at sea, but the researchers wanted to emphasise the development of a second method of finding longitude at sea, the lunar distance method, which was used alongside the timekeeper method, as a complementary, rather than rival, method. This helped both counter the 'lone hero' narrative that had hitherto remained unchallenged, and to emphasise the complexity of the longitude story as whole.

Use of people, personalities, and characters can be a useful way of telling audiences about new discoveries, inventions and innovations [Watkins, 2012]. Audience research told us that people are interested in people. Consistently, we were told they wanted the human stories of the people who developed the new technologies, not the 'language of measurement-devoid of emotion and limited conscious relevance' [Watkins, 2012]. Harrison's story is compelling, which is why Sobel's *Longitude* was a bestseller. With that in mind, the history of science blogger and Co-Investigator of the project, Rebekah Higgitt, has pointed out that the role of

historians of science in science communication has to be more than that of a myth-buster, otherwise we may come across as killjoys. So as not to be killjoys, as Higgitt has identified, the exhibition needed to provide an additional account alongside that of Harrison and his clocks to open up the story. We did this in the exhibition by providing a complementary story of the development of the lunar distance method. Again, this needed its cast of characters to satisfy the audience's wish for people stories, without over-emphasising the technology.

It is possible to satisfy your audience's need for people stories without creating heroic narratives. In the 'Longitude Solutions' section of the exhibition, we identified the five potential solutions to the problem of longitude at sea as discussed by Isaac Newton in 1714. Each method had a champion, a human face to connect to the proposed technical solution: Edmond Halley and magnetic variation; William Whiston and rockets; John Flamsteed and lunar distance; Galileo Galilei and Jupiter's moons; and Christiaan Huygens and the timekeeper method. We deliberately used people's awareness of characters from the history of science, such as Isaac Newton, Edmond Halley, and Galileo Galilei, as a point of entry for those unfamiliar with the story of the eighteenth-century quest for longitude. That these people, whom audiences might already be familiar with, were involved in attempting to solve the problem, also helps highlight the importance of finding a solution to the longitude problem in eighteenth-century society. It can also help engage audiences by surprising them: those who have only ever heard of Newton in the context of the apple and the tree and gravity, suddenly consider him in a different context.

Once again, live interpretation can offer something that an exhibition cannot. Our Visitor Experience team and volunteers ran tours of the exhibition, which allowed us to present a more nuanced account of the relationships between these eminent scientists. For example, one popular gallery tour focussed on the friendship that turned sour between Flamsteed, Newton and Halley, after Newton and Halley became frustrated with Flamsteed's refusal to publish the data he had been painstakingly recording at the Royal Observatory.

Ships, Clocks & Stars: The Quest for Longitude has shown that you can exhibit a multi-person story and a robust history of science exhibit, that will still engage people, and I think this shows there is space and appetite for more nuanced history of science within science communication. Partnerships between organisations can deliver impact to a range of audiences and, using a variety of engagement methods, with a variety of audiences, allows you to get your message across, while meeting the needs of your audience. By working together, historians of science and science communicators can produce something that is greater than the sum of its parts.

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