

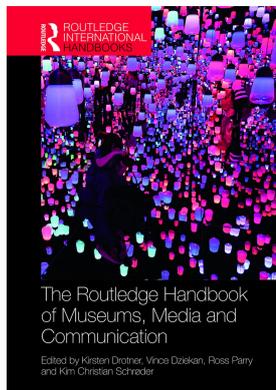
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The museum as media producer

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I.2

The museum as media producer

Innovation before the digital age

Peter Pavement

In the museum sector, it is not uncommon to hear a lament on how far “behind” institutions are with their use of media technologies. This refrain among museum professionals (Steele, 2013; Ansty, 2016) is reinforced by sector reports that have focussed on a “gap” in provision (Council of Canadian Academies, 2015; NESTA, 2013). Other discourses exhort museum professionals to grasp the “new” and the “future” (London School of Economics, 2009; American Alliance of Museums, 2013–2016). However, these statements belie the long history of museum media production that began nearly as long ago as museums did themselves. It is a rich history of collaboration with industry and media organisations, paving the way for numerous innovations and reinterpretations of museum “content.” This chapter explores early museum media through a survey of notable museum media experiments and productions drawn from institutions such as the American Museum for Natural History in New York, Stedelijk Museum in Amsterdam, Deutsches Museum in Munich and the University of Cambridge’s Museum of Archaeology and Anthropology. These examples, albeit sited at large, research-intensive institutions, demonstrate that (perhaps in contrast to commonplace misapprehensions that still echo in the sector) museum professionals in actuality have often been very keen to adopt new media technologies as soon as they become available, and even have helped to develop entirely new technologies in order to serve particular communication objectives of their museum. The chapter concludes with a discussion of the bi-directional impact of collaboration with commercial partners and the manner in which museums fulfil or extend their missions through the adoption of novel media forms and formats.

The adoption and development of media technologies

Although not a new media technology by the time museums were publishing, the 18th and 19th centuries saw the costs of book production continue to fall, alongside technological developments that made it easier and faster to produce books. Paper production and typesetting became mechanised, and cloth binding replaced leather (Hughes, 2010; Stevenson, 2010). Museums took advantage of these developments and began to establish publishing operations, some even commencing publication as soon as they opened, such as the Natural History Museum’s (NHM, n.d.) publishing house in 1881.

Early museum publications centred on the collection catalogue, producing books that perhaps served as the only way interested persons could find out what a museum actually held. In-gallery labels could be hard to read, cryptic and sometimes absent altogether (Haskell, 2000), so catalogues acted as gallery guides for museum visitors. As the collections expanded, so the publications became more varied and specialised, even if they were still essentially catalogues. For example, the British Museum published *Catalogue of hispidae in the collection of the British Museum* by Joseph S. Baly in 1858 to document this one particular form of insect (British Library Catalogue). Writing about these catalogues in the context of art museums, Giles Waterfield classified the publications into “inventory catalogue” – giving the location, artist, title and other simple data about a work, “expository guide” – an enhanced version of the inventory catalogue that also included commentary and was produced in a format portable enough for use in-gallery, and “presentation volume” – a prestigious illustrated edition to act as a “museum on paper” – often used as gifts to visiting dignitaries (Waterfield, 1995) (Figure I.2.1).

Patents for motion-picture cameras began to be granted in the late 1880s and early 1890s, and by the end of the century, cameras were being put to work in the field by anthropologists. Most famously, the availability of cameras (both motion and still), along with wax-cylinder recorders, meant that Alfred Cort Haddon and his colleagues were able to capture images and recordings of music, dance and life in general during the Torres Strait Expedition of 1898. Haddon brought back the expedition’s artefacts and recordings to what is now the University of Cambridge’s Museum of Archaeology and Anthropology (see, for example, Herle & Rouse, 1998). The approximately 300 photographs, phonographic cylinders and



Figure I.2.1 From a “presentation volume” – third room, second facade of the Düsseldorf Gallery. Printer’s proof of Nicolas de Pigage and Christian von Mechel, *La galerie électorale de Dusseldorf*, 1788. Getty Research Institute, image 870670, 2010.

four minutes of film (Edwards, 1997) were captured by Haddon as a means to *record* a disappearing way of life:

It is our bounden duty to record the physical characteristics, the handicrafts, the psychology, ceremonial observances and religious beliefs of vanishing peoples; this also is a work which in many cases can alone be accomplished by the present generation. ... The history of these things once gone can never be recovered. (Haddon, 1897, p. 306)

The media produced is a good example of photography, phonography and film being used as a recording tool in the field by academic researchers, but its significance to museology is the manner in which the media products became as much part of a museum collection as the ethnographic artefacts that had been brought back from the expedition. Following his return, Haddon himself assisted the presentation of exhibits about the Torres Straits Islanders at a multitude of venues, including the British Museum, Glasgow City Museum and Gallery and the Horniman Museum in London, but a century later an exhibition could be presented from the University of Cambridge's Museum of Archaeology and Anthropology collection, which made use of Haddon's media as being representative of the Torres Straits cultures on equal terms as the islanders' artefacts that had been brought back to the United Kingdom (Herle, 2001).

By the turn of the twentieth century, audio recording and playback technology, often going by brand names such as Gramophone, Phonograph or Victrola, was becoming more widespread, attracting the attention (and enthusiasm) of museum practitioners:

Prof. Anton Fritsch, of Prague, has playfully suggested that the day may come when a visitor, standing in front of some interesting specimen, will have simply to drop a coin into a slot connected with a phonograph, and forthwith he will hear a short discourse on the specimen in the very words, nay, even the very voice, of some distinguished professor. ... We already have in the Essex Museum, for the use of the public, a microscope and a spintharoscope. Why not a phonograph? F.W. Rudler, Essex Field Club in 1905. (Fritsch, 1904)

Fritsch's exhortation to embrace technology in order to bring the curatorial voice into the gallery came soon after European museum curators convened for the Mannheim Conference on "Museums as places for popular culture," that was held in 1903 and had been reported on in that year's *Museums Journal* (1903). The very title of the conference indicates that museums were significantly shifting positions, reorienting themselves around the needs of the visitor and seeking to enhance exhibits with the tools available.

In 1908 the American Museum of Natural History (AMNH) put Fritsch's proposal into practice, making use of gramophones to provide commentary as part of its international exhibition about tuberculosis. The exhibition was very successful; an example of the museum as a place of popular culture as per the Mannheim Conference. The show attracted more than 750,000 visitors over the course of a seven-week run, the highest attendance any exhibition at the AMNH had ever attracted (Brown, 2014). A contemporary review stated: "at every stopping-place a talking machine delivered short lectures of warning and advice" (AMNH, 1908; Griffiths, 2008). Meanwhile, audio and visual material became further embedded as part of collecting practice, as recording of music became easier and as cinema and film-making began to be recognised as an art form in itself. For example, in 1907 the Paris Opera House founded what they termed a "Museum

of Phonograph Records” to preserve a collection of recordings of singers of the day. This was, in fact, more of a “time capsule” with storage facilities designed to preserve the records for as long as possible, rather than any attempt to engage with the public or academia (Walsh, 2008).

Museums were also commissioning their own films as the twentieth century gathered pace; the American Museum of Natural History produced its first film in 1912 – a recording of an expedition, by assistant curator Roy Chapman Andrews on a Korean whaling vessel, to collect specimens of whales. Building on the practice established by the Torres Straits expedition, the museum was funding the use of media as a recording function for expeditions that were part of its research activities. Concurrently, film had come to the attention of the education department of the institution. The museum established a film library of its own in 1914 and donated reels, and from 1922 the library was permitted to lend out films off-site to schools. Having developed the production capabilities to document its research work in the field via film, the museum also began to produce movies for entertainment purposes, including *Simba*, the 1928 film by husband-and-wife team Martin and Osa Johnson, which was able to go beyond the walls of the institution as it enjoyed a theatrical release. Another New York institution, the Museum of Modern Art, also established a film library in 1935, which eventually became MoMA’s Department of Film. Within four years of its establishment, the library was admitting audiences of 500 people to its screenings (MOMA, n.d.).

Through these developments, curators progressed from using film as a recording device on expeditions, or as a resource for exhibition in a theatre setting, to using film as a method of enhancing interpretation in the gallery. However, this raised a technical issue – the physical demands of running the same film on a constant loop for many hours a day meant that gallery designers had to develop techniques to make the film itself more robust and reliable.

The AMNH’s response was to install “The Dramagraph,” consisting of a metal box with a screen aperture at the top of one side (Figure I.2.2). Within the box, a projector ran film

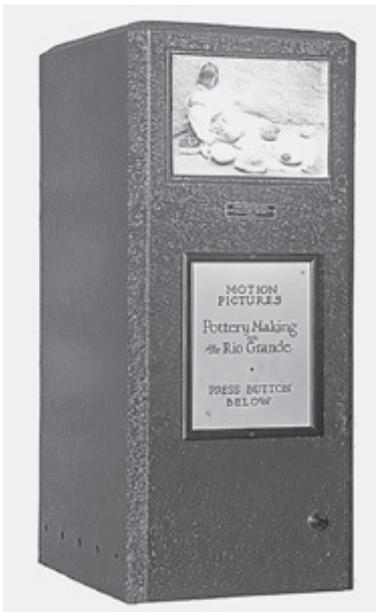


Figure I.2.2 1930s “Dramagraph” film display unit from the American Museum of Natural History. Photograph American Museum of Natural History Library, image 313366, n.d.

that had been mounted onto steel tape to prevent the projector's cogs wearing through the sprockets in the celluloid filmstrip. In the AMNH's photograph archive is an image showing the Dramagraph that was used in the North American Indian Hall to show field footage of "Pottery making on the Rio Grande." We know from an article in the *Museums Journal* in 1931 that the Dramagraph was also used in the Science Museum in London in the 1930s (Griffiths, 2008).

These examples help to illustrate how museums have been keen adopters of novel media technologies, finding ways to make use of new apparatus and media formats in the pursuit of their activities – be that the recording of research material (Haddon's use of film, photography and phonography at Cambridge), the preservation of media as a cultural artefact (Paris Opera House) or the presentation of interpretation to their visitors and other audiences (AMNH). However, as well as being *consumers* of media technologies, museums have also been active participants in the development of innovations in media technology. For example, the planetarium at the Deutsches Museum was one such museum-based research and development success. In 1913, astronomer Max Wolf persuaded Deutsches Museum Director General Oskar von Miller to commission the optical-equipment manufacturer Carl Zeiss to create the technical apparatus for a planetarium. Prior to the commission, the plan was for a "walk-in perforated plate sphere with holes representing the stars and illuminated from the outside," (Deutsches Museum, n.d.a) but a shift in ideas led the originators to consider the use of projection from the inside (Figure I.2.3). Projection was a media technology familiar through a rich tradition from magic lantern slides through to early cinema, but the planetarium would require a new mechanism, featuring multiple lenses, capable of projecting astronomical features individually, timed to a presentation programme. Interrupted by the First World War, the planetarium was not completed until 1923 (Deutsches Museum, n.d.a).

A key element of the planetarium concept was the requirement for a particular kind of venue, a dome, that when its interior was darkened and projected upon, would create a simulation of the night sky. Incidentally, the Munich development also demonstrated innovation through structure of the dome itself – a geodesic frame was constructed, preceding R. Buckminster Fuller's popularisation of the form by several decades (Buckminster Fuller Institute, n.d.). Part theatre, part cinema and always educational, the planetarium created a



Figure I.2.3 Building an experimental dome at the Carl Zeiss factory. Photograph *Popular Mechanics*, 1929.

space within a space. It was a short step to realise that a planetarium could operate independently of its museum parent, and by 1930 installations had opened in Rome, Moscow, Stockholm, Milan, Hamburg, Vienna and Chicago (Engber, 2014). Technology partner Carl Zeiss also went on to market their projectors to these and other emerging venues with great success and, since then, “Zeiss Projector” (Figure I.2.4) has become a generic term for the machine at the core of a planetarium, even when not manufactured by Carl Zeiss itself (Chartrand, 1973).

Today one of the most pervasive forms of media used for interpretation within museum galleries is the audio guide. This has its roots in an early 1950s experiment by the Stedelijk Museum in the Netherlands. The Dutch electronics giant Philips helped to develop the technology, which in this case used a technique much like an induction loop to broadcast the output of a centralised tape recorder to listening devices carried by museum visitors. The devices essentially functioned as radio receivers, with a single programme broadcast (in Dutch, French, English and German) to all listening visitors at the same time, no doubt causing bottlenecks in the galleries as people tried to view the described item simultaneously (Tallon, 2009) (Figure I.2.5).

In 1954, the ever-pioneering American Museum of Natural History introduced its “Guide-a-Phone” (Figure I.2.6). From that point on, the audio guide increasingly became an established part of (at least major) museum exhibition practice. In 1957, the medium became a service offered by the private sector, with the founding of Acoustiguide, which was launched with a tour of Hyde Park, the home of President Franklin D. Roosevelt (Acoustiguide, n.d.).

In the 1920s and 1930s, museums had been invited to present lectures on broadcast radio stations, one example being the Brooklyn Museum’s Curator in Chief, Daniel M. Fox, who was being heard on WNYC public radio from 1922 (Brooklyn Museum Archives, n.d.). The focal point for both the broadcaster and the museum in this programming seems to have been education. Broadcaster CBS (Columbia Broadcasting System) became an outlet for lectures by the American Museum of Natural History, under the programming strand “the American



Figure I.2.4 Zeiss Mark 1 Projector the Zeiss planetarium installed at the Deutsches Museum. Photograph Deutsches Museum, 1925.

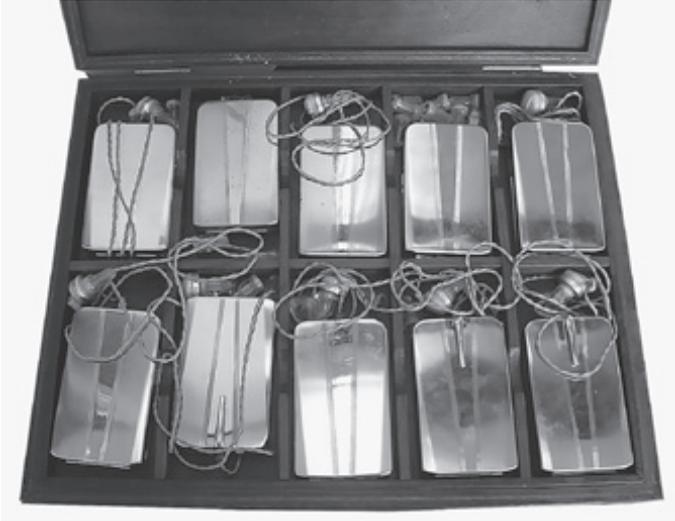


Figure 1.2.5 A case of audio receivers used at the Stedelijk Museum, Amsterdam. Photograph Tallon, 2009.



Figure 1.2.6 The 1954 Guide-a-Phone from the American Museum of Natural History. Photograph American Museum of Natural History Library, image 323699, n.d.

school of the air.” In the *Movie and Radio Guide* listings magazine from the 1940s, a listener breathlessly recounts:

One day young Ken stayed home from school with a bad cold. That bad cold turned out to be the luckiest bit of misfortune that ever happened to me. I bundled him up on the living-room couch, turned on the radio and went out to market. When I came back, I found young Ken listening, fascinated. I sat down and listened, too. What I heard was a vivid and dramatic description of exploration in the Gobi Desert. The speaker, Dr. Roy Chapman

Andrews of the American Museum of Natural History of New York, was recounting one of his fossil-hunting expeditions. I found myself hanging on his words, holding my breath as he described the dangers and thrills of the trip, sighing with relief as the caravan arrived at its destination. When he stopped speaking it was announced that this was part of the American School of the Air course, heard daily except Saturdays and Sundays over the Columbia Broadcasting System. (Badger, 1941)

The big mass-media development in the United States during the two decades following the Second World War was television, and by 1955, 64.5% of United States households had a television, up from just 9% only five years before (Television Bureau of Advertising, 2012). Even in this mass-broadcasting context, where the financial barriers to entry were high, museums were also present and helping to drive innovation – as well as providing content and expertise in partnership with industry players. Most notably, the University of Pennsylvania Museum of Archaeology and Anthropology teamed up with CBS to produce the panel show *What in the World?*, which ran from 1951 to 1965. The museum's own account of the series reads:

By the early 1960s it was one of the oldest programs on television, bringing positive reviews and a steady stream of fan mail to the Museum that continues to this day. On each *What in the World?* program, four or five unidentified objects were presented to a panel of experts who were asked to guess what each piece was, where it came from, how old it was, and how it was used. Objects were selected from storerooms and had never before been seen by the panel. Before the experts guessed, the audience was told what the object was, and, during the course of the program, could watch the thought processes of real – and often fallible! – anthropologists and archaeologists. After they had completed their identification, the moderator, Froelich Rainey, Director of the Museum, told them whether they were right and if not, gave the correct identification. Only four episodes of the show survive. The special guest on one of these was the famous actor (and collector) Vincent Price. (Penn Museum, n.d.a)



Figure 1.2.7 Jacque Lipschitz, Carleton Coon and Vincent Price on *What in the World?* Photograph Penn Museum/CBS, 1955.

Despite the rarefied nature of the programme's subject matter when compared to other TV quiz shows aired in the United States at the time, *What in the World?* was popular enough to be shown at prime time. In his obituary for the show's moderator, Froelich Rainey, John Bockstoce expressed amazement that "a small group of experts could have been even remotely interesting as they sat stiffly under severe studio lights discussing the provenance of obscure artefacts, yet for a vast amount of people they *were* fascinating" (see Bockstoce, 1993, p. 89). *What in the World?* was one of the first media productions to provide viewers with access to people "backstage" at the museum; something that later expanded into a distinct television format (see, for example, the BBC's [British Broadcasting Corporation] 2010 productions *Museum of Life and Behind the Scenes at the Museum*) that tapped into audiences' curiosity for how cultural productions are made.

The United Kingdom television audience was also growing in the same decade; in March 1953, slightly over 2 million television licenses were issued; by 1959 the figure had risen to 10 million, 59% of all households (British Film Institute [BFI], n.d.; British Audience Research Board [BARB], n.d.). The television "format" of the *What in the World?* was borrowed by the BBC in 1952, becoming the series *Animal, Vegetable or Mineral?* (Attenborough, 2009), with Mortimer Wheeler at the helm. Wheeler was an archaeologist of some repute and founder of Institute of Archaeology in London. He had been director of the National Museum of Wales, the London Museum (later to become the Museum of London) and Director-General of the Archaeological Survey of India (Piggott, 1977).

A staff member of the production team was David Attenborough, later to become the United Kingdom's most recognised naturalist and broadcaster. As part of his role, his job was to travel to British museums to fetch objects to be featured on *Animal, Vegetable or Mineral?*, finding "it would turn out, of course, that he himself had actually excavated it and that he knew it backwards" (Attenborough, 2009). Attenborough was able to witness first-hand the surprising impact of television exposure of an "educational" topic, when packaged in the right format:

Animal, Vegetable or Mineral? went from success to success. It may come as a surprise to many here that in 1956 Sir Mortimer – an archaeologist not a pop singer – became Television Personality of the Year. And he deserved it. Librarians around the country told us that shelves on which archaeological books had sat untouched for decades were suddenly emptied. Archaeology had become a huge popular success. It was of interest to anyone with any degree of intellectual curiosity. It was a sensation. (Attenborough, 2009, p. 7)

The United States and United Kingdom programmes even came together to host a joint show in 1955, with panellists from both shows examining the same objects, on both sides of the Atlantic. Much more recently, in 2015, the format has revived and updated into the BBC Four series *Quizium* (BBC, n.d.).

In the second half of the 20th century, developments in digital computer technology increased in momentum. There are examples that demonstrate how many museums were keen to experiment with these technologies to help mediate their own messages and content. One such example is a computer-based exhibit at the Evoluon, Eindhoven, that was installed in 1970. Named the *Senster*, this was a four metres tall robotic sculpture that was displayed in a prominent position in the flying saucer-shaped museum. The Evoluon itself was a science museum that opened in 1966, conceived of by Frits Philips as a permanent celebration of the 75th anniversary of the electronics company Philips (evoluon.org, n.d.). The exhibition design for the entire museum was contracted to British designer James Gardner. For the entrance area

of the museum, Gardner commissioned a cybernetic sculpture from artist Edward Ihnatowicz, after Gardner had seen an earlier piece, SAM – Sound Activated Mobile – at the ICA (Institute of Contemporary Art) in London. Resembling a flower set upon a metal spine, SAM used microphones and electronic circuits to react to visitors to the exhibition and follow their movements as they proceeded through the gallery space. Made of steel and aluminium, the Senster expanded the SAM concept to a much larger scale and looked somewhat like a cross between an electricity pylon and a giraffe. It was fitted with microphones and a Doppler movement radar and would swing its “head” and “neck” around to the source of noise or movement in the room. A Philips P9201 (a rebranded Honeywell) computer was employed to interpret the input signals coming from the sensors and modify the movement of the sculpture accordingly. This digitally mediated feedback loop made the Senster appear to behave like a living creature, reacting to its environment and museum visitors, thus demonstrating the connection between sense and response found in the natural world (Gardner, 1993) (Figure I.2.8).

Working with collaborators

To realise the projects described in these examples, museums had to engage with companies involved in media production. Some of this engagement was purely by purchasing equipment and material that was already available, but many of these examples required a far greater degree of collaboration. The Deutsches Museum Planetarium involved Carl Zeiss in such a degree of research and development that the company actually built a mock-up dome on the roof of its factory between 1919 and 1923 in order to test their projector designs (Deutsches Museum, n.d.a). Exhibition designer James Gardner commissioned artist Edward Ihnatowicz to create the Senster for electronics giant Philip’s new Evluon museum. Ihnatowicz taught himself how to programme the wardrobe-sized computer provided by Philips, but in the end their engineers had to help him in order to master the complex relationships between the Senster’s sensors and

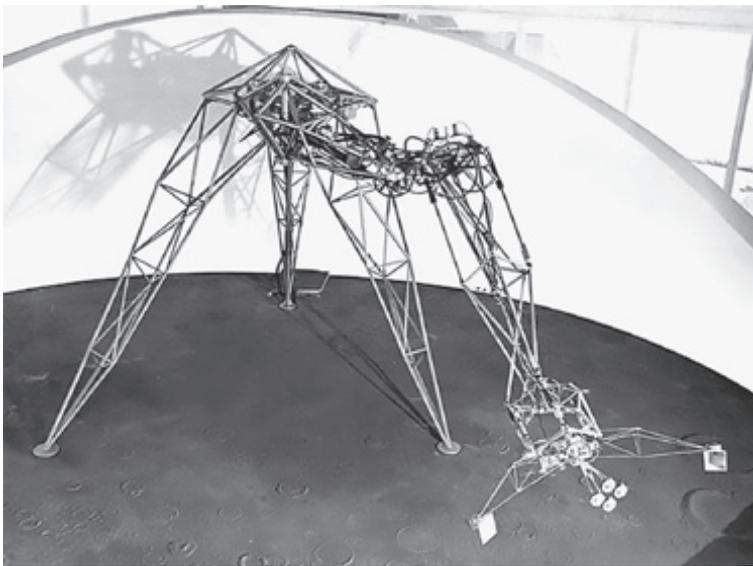


Figure I.2.8 The Senster on its base at the Evluon Museum. Photograph Philips Archive, 1970.

its movements (Gardner, 1993). The Penn museum became an integral part of a CBS studio production, as *What in the World?* was broadcast over 14 years.

Innovations such as the planetarium or the audio guide became something that could be further exploited outside of the direct relationship between client museum and supplier company. The Carl Zeiss projector became the foundation of hundreds of planetaria worldwide. The 1950s development of the tape-based audio guide at AMNH was followed swiftly by the founding of Acoustiguide in 1957 – a company that has sustained until the present day, providing audio guides for a huge range of museums and other venues around the world (Acoustiguide, n.d.).

Just as companies see products, techniques and methods that can “spin out” from museum-based media activities, they also can begin to see the museum as a market in itself. Ideas, information, proposals and pitches travel back and forth between museum and potential suppliers as relationships become established and formalised. This interplay can be charted through the evolution of the gallery space itself. In the photographs of gallery spaces below (Figure 1.2.9), starting with the “classic” arrangement of cases and objects at the Ashmolean Museum in Oxford, United Kingdom, in 1910 (top left), we can see the colonisation of the space by design and media technologies. The 1950 AMNH gallery (top right) is presented as an interior architectural composition, while the Brooklyn Museum in 1971 (centre left) shows how reproduction technology (typesetting and large format printing) are used to communicate



Figure 1.2.9 A series of images showing the incorporation of design and media technology into museum galleries over time. Photographs (clockwise from top left): Ashmolean Museum, 1910; American Museum of Natural History Library, image 00325921, 1950; National Maritime Museum, 2000; Trustees of the British Museum, 2014; Australian Natural History Museum, 2010; Brooklyn Museum, 1971.

interpretation without reference to objects at all. Large formatting printing is perhaps a little-recognised media technology, but its use in gallery spaces has become widespread and often a bold part of the overall presentation, as demonstrated by this example from the United Kingdom's National Maritime Museum in 2000 (centre right). Finally, the museum gallery has become a locus for more and more screen-based and projection-based presentations, here illustrated by "touch tables" being used at the National Museum of Australia in Canberra (bottom left) and the seascape projected into "Vikings: life and legend" exhibition held at the British Museum in 2014 (bottom right).

In summary, by choosing to utilise media, museums have had an influence on the shape of several media technologies and the activities of many of its commercial providers. However, this is a two-way process, and media technology has shaped the museum in a multitude of ways in return. The innovation process of media experimentation and development is a process of knowledge exchange between museum and supplier, but as technologies and practices become embedded and novel media forms and formats normalised, the museum sector has emerged as a distinct "market" for commercial firms, including formal processes for marketing and sales such as suppliers guides, trade shows and tendering of contracts (Museums Association, n.d.; American Alliance of Museums, n.d.).

Motivations for media innovation by museums

Why do museums go to the trouble of producing these media outputs? To do so involves considerable effort on the part of museum staff – agreements with colleagues, managers and stakeholders must be secured, outside collaborators or suppliers recruited and briefed and above all, a new media technology mastered and its limitations and/or failures managed. To get to grips with a medium involves the learning of both the format and the form – these terms are often used interchangeably in common parlance, but here we mean "form" to be the style and approach to content that will be delivered through a medium, and "format" to be the container that is used for that delivery. The form of the American Museum of Natural History's Dramagraph film was a documentary field recording of pottery making by Native American peoples; the format was a 16mm celluloid film, mounted onto steel tape for longevity (Griffiths, 2008). The form of the *What in the World?* series drew cues from quiz shows but found ways to introduce both scholarship and celebrity into the presentation; its format was a half hour television broadcast on the CBS network (Penn Museum, n.d.a). Sometimes the form and format had to be developed from scratch – the planetarium form was developed into a series of scenes of the night sky, narrated by an expert in astronomy and delivered to a static, seated audience; its format was projection of images into a custom-made dome construction.

Museums do not come to questions of form and format without experience, for almost all museums are highly focussed on their own intrinsic form, the exhibition, and format, the gallery space. A gallery exhibition is presented to the public having been through a process of conceptualisation, design, selection, construction and content creation, all with an audience in mind – it can be argued that in essence it is a form of medium itself (e.g. Kaplan, 2005). It is by creating exhibitions that much of the museum's experience of media production is acquired and developed. However, like all media, there are limitations to the gallery exhibition that constrain presentation, so museums have been motivated to adopt other types of media as they have arisen, to try to ameliorate those limitations. Although they have to learn, or even develop, the form and formats of each new medium that they try, their experience in producing interpretation in a form that suits their primary format is transferrable and reduces barriers to entry. Reviewing the historical examples in this chapter, we can see that the projects fall into the following groupings.

1 *Extending gallery interpretation*

Early museum galleries contained a lot less visible interpretation than those contemporary to us. Labelling was minimal, sometimes non-existent, and was often restricted to hand-written labels attached to objects. In time, written curatorial interpretation found its way into the gallery space in the form of extended captions, wall panels and large format graphics, but again, the finite space of the gallery means that these must be limited in quantity. Additionally, a gallery full of information becomes overwhelming for the visitor. Incorporating different media extends the ability of the gallery to deliver interpretation without using every available space for text.

Several of the examples explored above attempt to provide more interpretation in a finite space. For example, the gramophones used in the American Museum of Natural History (AMNH) International Tuberculosis Exhibition in 1908 and 1909 gave visitors access to hundreds of words by curators and experts, but only gave up the gallery space equivalent to a record player. The development of the audio guide, starting with the Stedelijk Museum's 1952 experiments with radio transmission and the AMNH's Guide-a-Phone audio tape player, greatly expanded the amount of interpretation that could be presented to the visitor, without any spatial cost at all. Since then, audio guides have become a fixture in many museums and visitor attractions, supporting an industry of suppliers and generating income for many venues.

Some media types allowed interpretation to be extended in both depth and time – for example, the Dramagraph-based film at the AMNH connected the artefacts on display with footage of Native Americans making similar objects to those in the gallery. By observing the actions rendered in the Dramagraph's moving pictures, visitors could see how people moved and manipulated tools or materials in the production of pottery – and their understanding of the artefacts enhanced.

2 *Preserving content beyond the life of an exhibition*

Many exhibitions are temporary but impart to the museum great prestige and many opportunities to engage with their audiences, sponsors and other stakeholders. Capturing an exhibit into a media format preserves the content, even if the form must mutate somewhat during “capture.” More significantly, turning an exhibit into a media product also helps to extend the benefits to the museum for a longer time span. Publishing, from princely volume to the coffee table book, has been a key point of alternative dissemination of exhibit content, coupled with the accrual of status and (sometimes) income from sales. More recent methods of lifespan extension include DVDs, “online exhibitions” and dedicated apps.

3 *Developing tools for education*

A highly creative motivation for media production by museums is to be able to explore a topic in much greater depth. In particular, science museums are particularly drawn to this mode of interpretation, where the construction of an item to communicate knowledge is positioned on almost equal terms with the objects from the collection. The Evoluon's Senster, installed in 1970, was commissioned by the museum's exhibition designer in order to demonstrate the feedback loops between senses and behaviour that can be found in the natural world (Gardner, 1993). The robotic sculpture moved according to the digital interpretation of stimuli to its sensors, but it required interpretation in the traditional exhibition forms of text panels and diagrams that were adjacent to the Senster's setting. The Planetarium, however, was a larger-scale project, requiring the construction of a dedicated space, the development of a means to project astronomical

features into that space and the creation of a theatrical programme to interpret what was being shown with a live narrative. In this case, the museum separated itself entirely from collected objects or gallery exhibition forms of communication (labels, panels) and created something that was capable of standing alone. The motivation was to educate the public exclusively by using the knowledge embodied in the museum rather than any of its artefacts.

4 Going beyond the walls of the museum

This motivation to communicate and educate, even without reference to collections, springs from the mission espoused by so many museums. The American Museum of Natural History was incorporated with the purpose of “encouraging and developing the study of Natural Science; of advancing the general knowledge of kindred subjects, and to that end of furnishing popular instruction and recreation” (AMNH, 1908). The Deutsches Museum’s present mission is to be “an outstanding place for communicating scientific and technical knowledge and for a constructive dialogue between science and society” (Deutsches Museum, n.d.b). The University of Pennsylvania Museum of Archaeology and Anthropology states that it was founded in 1887 to “bring together under one roof artefacts that evidenced the development and history of humanity from antiquity to the present” and then goes on to declare that it exists to “transform understanding of the human experience” (Penn Museum, n.d.b).

With these lofty goals, it is no great surprise that the museums saw no barrier to their activities at the extent of their physical domain – namely their own buildings. The AMNH was happy to contribute programmes to the *American School of the Air* and the Penn Museum to make such a large commitment of their time and resources to the CBS panel show *What in The World?* over its 14-year run. The Senster and the Planetarium were developed purely to impart knowledge without reference to objects, and the radio and television shows were developed to disseminate knowledge without the need for a physical museum. Both approaches continued to fulfil the mission of their institutions, even though form and format were a world away from the gallery exhibition.

Conclusion

When examining the relationship between museums and media, there is a danger that we only see the latest technologies, practices and ideas, constraining our focus to just the dominant media forms of the present day. However, museums have been engaged with media production from their beginning and have continually demonstrated a willingness to engage with new technologies and new forms and formats of media. This kind of innovation was often expensive, demanding of resources, and required the forging of partnerships with commercial and other providers. Creative strategies included using media to deepen access to collections, to extend the life of exhibition content and to impart the embodied knowledge of the museum. They also used media technologies to reach new and more distant audiences by going “beyond the walls” of the museum. These activities were almost always risky for the institution, yet museums were prepared to shoulder that risk in order to further their fundamental reason for existence – their mission.

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