

Staging listening: new methods for engaging audiences with sound in museums

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Abstract

This article reports on the experimental methodology and key findings of the AHRC-funded impact and engagement project Sonic Futures: Collecting, Curating and Engaging with Sound at the National Science and Media Museum (2020–21). The project undertook a series of listening-based public engagement activities – described here as *staging listening* – to identify new ways of engaging listening audiences with sound technology objects in museums. These activities led to the creation of three new interactive sounding exhibit prototypes created jointly with audiences. Because the project took place during periods of lockdown caused by the coronavirus pandemic in the UK in 2020–21, the exhibit prototypes were created digitally and tested via online interaction. The article argues that engaging with listening audiences can diversify and enrich museum *listening scenarios*, a term we use here to describe auditory situations which elicit different kinds of listening attention, interaction and learning. These listening scenarios produce divergent *signatures of listening*, a concept we develop here to describe the various kinds of learning and engagement we observed throughout the project.

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Keywords

Audiences, audio, BBC Radiophonic Workshop, echo, exhibition prototyping, listening, National Science and Media Museum, sound, sound archives, sound postcards, sound technology

Introduction

Museums are not typically thought of as places for listening. Although exhibitions contain headphones and loudspeakers

alongside the varyingly ebullient hubbub of visitors there is nonetheless, as museum sound design advocate Tom Everett puts it, 'a visual bias that is well known and long established in museological practice' ([2019, p 320](#)). This bias results in a lack of attention being paid to acoustic planning in exhibition spaces ([Everett, 2019](#)), but also in an ocularcentric approach to object collection which prizes visual display over other ways of sensing (an alternative sound-based approach is proposed by [Kannenbergh, 2019](#)). This situation is, though, beginning to change. In 2021, two Science Museum Group museums led their summer programme with sound-focused exhibitions: 'Use Hearing Protection: The Early Years of Factory Records' at the Science and Industry Museum in Manchester and not one but two exhibitions on the science and technology of sound – 'Sonic: Adventures in Audio' and 'Boom: Experiments in Sound' – at the National Science and Media Museum in Bradford. These exhibitions, as well as the development of new permanent galleries on *Sound and Vision* at the National Science and Media Museum, have demanded critical and practical consideration of listening in museum spaces.

In this article we report on a public engagement project Sonic Futures: Collecting, Curating and Engaging with Sound at the National Science and Media Museum, delivered in 2020–21 in the run up to the 'Sonic' and 'Boom' exhibitions. The project worked with the National Science and Media Museum's audiences to consider the question: What kind of listening places could museums become? The article addresses the tensions and characteristics of listening as a mode of interaction with sound technology objects in museum collections. It considers the ways in which interactive exhibits about sound technology might emerge from engagement with museum audiences through situations of collective listening. The article is divided into three sections. The first outlines the background and context of the Sonic Futures project. The second outlines the project's method of *staging listening* with museum audiences and argues that testing listening in this way can lead to more engaging and culturally embedded *listening scenarios* for exhibitions. The concept of community-created listening scenarios, by which we mean auditory situations designed to elicit different kinds of listening attention, interaction and learning, captures the form of listening-based pedagogy that we developed on the Sonic Futures project. The third section makes a series of recommendations for a more sound-considered museum based on our findings from the project.

1. Sonic Futures: context and background

It is widely agreed that museums shape how their visitors see the world ([Bennett, 2011](#)), but can they help their visitors to hear differently, too? Contrary to the assumption that museums were traditionally silent places ([Bubaris, 2014](#)), researchers are finding evidence that they have long been places for listening as well as looking, suggesting that the visual bias described by Everett ([2019](#)) might be a relatively recent development. From the early years of the twentieth century, museums used gramophones to bring the curator's voice into exhibitions ([Pavement, 2014, p 14](#)). Rich ([2017](#)) finds that in the mid-twentieth century Science Museum curators exhibited sound technology objects such as gramophones to demonstrate their *sounding* qualities, encouraging participation in the audiophile culture that accompanied the rise of home radio and gramophone listening. In the same period, the Victoria and Albert Museum not only displayed its collection of musical instruments but was also a 'hotspot' of live concert culture which shaped public listening habits by, for example, prompting a revival of interest in Renaissance and Baroque music (Bailey et al, 2019, p 328). Today's curators continue to be inspired by the idea that museums can be places for sound. Bubaris ([2014](#)) concludes that exhibitions which make integrated use of sound effects, musical accompaniment and spoken-word audio can create 'a dynamic environment, where meaning and experience emerge simultaneously' ([Bubaris, 2014, p 400](#)).

Creating listening experiences for museum visitors is especially pertinent where an exhibition's subject or the objects within it relate to sound culture. In the case of the National Science and Media Museum, whose mission since 2017 is to explore 'the transformative impact of image and sound technologies on our lives' ([National Science and Media Museum, 2021a](#)), the question of how to tell the story of technology's role in recording, storing, reproducing and representing sound is a matter of institutional policy as well as of exhibition design. The National Science and Media Museum was, prior to 2017, focused on the media of photography, film and television. The adoption of a new focus on image and sound technologies, together with a new dedicated Sound Technologies Collection, was intended to consolidate the Museum's focus on visual and audio-visual media technologies (rather than, say, the infrastructures of telecommunications or computing). It was also, however, intended to help the Museum engage audiences in new ways through sound's power to move and inspire people. As a museum of audio-visual media technologies, the National Science and Media Museum would become known, it was hoped, as a site of audio as well as of visual experience. The re-launched National Science and Media Museum aims to inspire the scientists and engineers of the future to 'see more, hear more, think more and do more' ([National Science and Media Museum, 2021b](#)). A guiding question for

the Sonic Futures project was: How should museums go about helping people to 'hear more'?

We began the Sonic Futures project with the aim of trying out Boon et al's (2017) recommendation that exhibitions *about* musical and other sound-related objects should adopt a 'sonic-theatrical style' delivering auditory experiences which engage visitors in 'different modes of listening'. These listening modes could give visitors an insight into the listening practices of the people who originally created or used the objects on show. Research in the academic field of sound studies (see Bull, 2019) has shown that listening is a professional skill deployed in various ways by artists, doctors and nurses, engineers, musicians, scientists and others (Bijsterveld, 2019; Voegelin and Wright, 2021). Sterne (2003) describes this as 'audile technique' (Sterne, 2003, p 23). Such listening often involves auditory relationships with objects. The listening performed by cardiologists, for example, is essential to explaining the material history of stethoscopes (Sterne, 2003).

The National Science and Media Museum's Sound Technologies Collection is just the sort of collection that might benefit from the 'sonic-theatrical' style of display outlined by Boon et al (2017) and contains objects with rich expert listening histories. It contains technologies of 'public address for both speech and music'; 'personal, domestic and professional recording and playback technologies'; and 'formats of audio capture and storage' (Science Museum Group, 2016). These objects, including loudspeakers, microphones, mixing desks, radio receivers and synthesisers, reflected and shaped listening cultures in their period of origin and in their place of use, from the professional lab to the domestic living room. They are sometimes visually iconic (such as the BBC Marconi AXBT ribbon microphone shown in Figure 1), but more often need sound to be fully understood. For example, objects used at the BBC Radiophonic Workshop (Figure 2), where composers such as Daphne Oram and Delia Derbyshire pioneered new techniques for producing electronic sound effects for radio and television, contain rich histories of media creativity that are difficult to communicate through visual presentation alone. The BBC Radiophonic Workshop manipulated recorded and machine-created sound via techniques such as tape cutting and splicing in a process that radio producer Donald McWhinnie called 'a science of making sound patterns' (McWhinnie, in Niebur, 2020 p 29). To fulfil its mission to inspire future Delia Derbyshires, the National Science and Media Museum must help its visitors to *listen like she did*, and to create like she did. To do that, the Museum needs exhibits that make sound.

Figure 1



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BBC Marconi AXBT ribbon microphone

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Figure 2



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Objects used at the BBC Radiophonic Workshop, held in the Science Museum Group's Collections

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Putting the recommendations of Boon et al (2017) into practice at the National Science and Media Museum involved consideration of two challenges. First, the Museum conserves its media technology objects to maintain physical and visual integrity rather than function. Sound technology objects at the National Science and Media Museum, in short, do not make any sound. This is a widely practiced approach to conserving media technology objects in museums. The consequence, however, is that visitors cannot directly interact with sounds made by such objects. Nor can they usually listen to sound recordings of or made by these objects. The National Science and Media Museum does not collect recorded sound to accompany its sound technology objects. Audio recordings are typically collected by archives rather than museums in the UK. Co-operation between the two kinds of institutions remains surprisingly rare. This makes it a real challenge to deliver listening experiences which take visitors into the past sounding lives of museum objects. How to do so with a genuine faithfulness to historical ways of creating and listening to the kinds of sound connected to the objects in the Sound Technologies Collection was a question we took up in the Sonic Futures project.

The second key challenge we identified from the outset was the *other* side of the museum listening equation: the visitor. Historians have turned listening into a professional skill (Mansell, 2020; Mansell, 2021). Can this mode of listening be extended to museum visitors as a form of public history? Brooks et al (2019) offer a cautionary tale: they created a 20-minute loudspeaker sound installation at National Trust property The Vyne, a Tudor palace, to engage visitors in academic research about the history of Tudor music and prayer, but observational research showed that 'The majority (67%) of visitors observed spent less than a minute' listening to it (Brooks, 2019, p 449). We had anecdotally observed similar challenges at the National Science and Media Museum, where family groups with children make up a significant portion of the audience. In the Sonic Futures project, we decided to *begin with the listener*. We wanted to focus on the moments of encounter between objects and listeners to understand how we should go about creating listening scenarios for visitors in museums. We were nonetheless

mindful of Sterne and De Luca's (2019) argument that museums should avoid normalising a singular kind of listener and listening as universal. Rather than determine what sounds should be heard in the museum and how they should be presented, we wanted to work directly with different kinds of audiences who would bring with them their own ways of listening.

Thinking through the proposition of a 'sonic-theatrical' approach to exhibiting the National Science and Media Museum's Sound Technologies Collection, the Sonic Futures project sought to develop diverse sonic modes of audience engagement with museum sound technology objects. We were interested in how museum audiences listen, sonically engage with, and make sense of museum objects – and more broadly museums as sounding spaces – and how paying attention to these forms of visitor listening might pave the way for a more responsive and engaged practice of sonic curation. Because practices of listening are still less well understood in processes of curation than practices of looking, it seemed to us that a productive way to support new practices of sound curation would be to seek better understanding of how audiences listen. We also saw working with audience listeners as a way to diversify the approaches to listening that feed into exhibition-making and to make sounding exhibitions more representative of their audiences. There is an important place for curator-directed sound curation in museums – curators are uniquely placed to excavate the auditory lives of the objects in their care – but museums could also, we thought, become places where audiences actively shape the listening environment, bringing with them sounds and ways of listening that might not otherwise feature in exhibitions. Abi Khalil, Daou and Mishlawi (2019) show that audience voices on audio guides can re-animate silent objects and bring a new rhythmicity to museums. We wanted to know more about how such audience-created listening scenarios might unfold at the National Science and Media Museum. We thus set out to take some first steps towards *co-producing* sounding exhibit prototypes with audience groups (Graham, 2016).

What we had not accounted for in our planning was the Covid-19 pandemic that shut UK museums in month three of our 18-month project. We managed two in-person events in the Museum before having to find online alternatives. In what follows, we report, therefore, not only on our attempts to investigate museum listening, but also on our efforts to do this digitally, and on our growing understanding of the museum listening environment as a digital as well as a physical landscape. We had planned to co-create and demonstrate three physical exhibit prototypes in the galleries of the National Science and Media Museum. What we did instead was create digital, interactive web-based listening experiences which engaged publics via online collaborative and social media, but which could nonetheless also form the basis of future museum-based experiences. The lessons we learned were resultantly about diffuse listening publics and how museums can connect with them and about listening in the 'hybrid' museum of the future.

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2. What we did: Staging listening

The methodology deployed on the Sonic Futures project took the form of a custom-designed experiment in listening-based public engagement. Our objective was to collaborate with audiences in designing three new sound-making exhibit prototypes that could feature in future exhibitions about sound technologies. We determined in advance that each exhibit would be based on a different type of object from the National Science and Media Museum's Sound Technologies Collection. Objects used at the BBC Radiophonic Workshop (Figure 2) were selected because of their significance in the history of electronic sound and music. Niebur (2010) argues that from its formation in 1958, the BBC Radiophonic Workshop was internationally significant not just as an innovator in radio and television sound effects, but also as a node in the furtherance of electronic music as an emergent art form. Workshop member Delia Derbyshire's role in creating the theme tune for popular television show *Doctor Who* also provided us with a useful hook for public engagement. Echo effect units, such as the Watkins Electric Music Copicat Tape Delay (Figure 3), were selected because they are well represented in the Museum's collection and played a prominent role in the development of popular music genres such as rock and dub reggae. Gramophone or sound postcards (Figure 4), a once popular but now obsolete technology consisting of a gramophone record attached to a postcard that delivered an audible message or musical excerpt through the post, were selected because of their potential to spark engagement about the history of communication.

Figure 3



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Watkins Electric Music Copicat Tape Delay, c. 1961–62

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Figure 4



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Gramophone Record Postcards

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We recruited three separate audience listening groups drawn from the Bradford area for each of these object types. The groups represented different segments of the Museum's audience: children and their families were assigned to the Radiophonic Workshop prototyping; independent adults aged over 40 with an enthusiasm for sound technologies joined the group working on Echo effect units; and independent younger adults aged 18–30 with a general interest in attending arts events took part in the Sound Postcard strand. Participants were recruited using the Museum's email lists, especially those connected with 'Late' adult-only events; through the Museum's social media accounts, especially Twitter ([@MediaMuseum](#)); and via existing learning and community partnerships with, for example, local schools, the local community radio station Bradford Community Broadcasting, and regional arts charity Yorkshire Sound Women Network. The purpose of dividing the listening groups up according to different audience segments was to learn about how best to engage with the different kinds of people who typically visit the National Science and Media Museum with differing degrees of regularity. For the purposes of this project, we were especially interested in understanding the Museum's core audience group, which is children and their families, in comparison with two key visitor groups which the Museum wishes to engage with and attract more regularly: adults aged over 40 with an enthusiasm for the subject matter of media technologies, and younger adults aged 18–30 with an interest in arts events. We could have set out to engage with entirely new audience groups or with groups who are under-represented in the Museum's visitor base according to categories of ethnicity, gender or cultural background. We chose not to do this, partly because the pre-existing [Bradford's National Museum](#) project was already engaged in addressing some of these questions in relation to communities in the city of Bradford, but also because we wanted to understand how existing audience groups connected to the Museum, either as core visitors or as targets for increased participation, responded to the new Sound Technologies Collection.

Children and their families were assigned to the BBC Radiophonic Workshop strand because plans were already in place to feature objects from the Workshop in the new permanent *Sound and Vision* galleries. These galleries must deliver content for the Museum's core child and family audience. Older adults with an enthusiasm for sound technologies were assigned to the Echo strand because of the potential for echo effect units to spark remembrance of memorable musical experiences from the past. Younger adults with an interest in arts events were assigned to the Sound Postcard strand because the subject matter lent itself

to creative activities such as sound recording and image making. Each audience listening group was assigned one or more professional listeners (artists, MCs, musicians, educators and designers) who were knowledgeable about the selected objects. These professional listeners were given the task of designing and producing the exhibit prototypes drawing on a programme of engagement with the audience groups. We set out a tripartite activity model for the exhibit prototyping which involved three stages: group listening sessions; iterative community exhibit prototyping; and listening demonstration. This part of the article outlines the three different stages in turn.

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Listening sessions

The Sonic Futures project pursued an ethos of learning through active sounding and listening engagement with museum objects. In contrast to the idea of sound in exhibitions as descriptive or narratorial, we were interested in listening sessions as an opportunity to practise listening with objects as a mode of active interaction and interrogation, a way of being with museum collection objects, and a process of understanding how sounding exhibits might take shape. The listening sessions were intended to be an experiment in co-producing ways of listening to sound technologies. By spending time actively listening together, we hoped to arrive at a way of encountering the collections objects acoustically that took account not just of the expert listening of our professional collaborators, but also the listening practices and dispositions of our audience groups. The exhibit prototype that would ultimately be the outcome of the listening group's work was a tool only; what we really wanted to co-create was a *listening scenario* – an activity, a feeling, and form of connection – that could be reproduced in future exhibitions. The listening sessions were designed to help staff at the National Science and Media Museum understand how their audiences listen, but also to give those audiences an opportunity to think through and create listening atmospheres and experiences for the Museum. We invited our professional listeners to formulate and deliver listening sessions to engage their groups with an auditory exploration of the allocated collections objects. While as a research project team we were responsible for selecting the combinations of artists, objects and audience listeners, we wanted processes of collective listening and exhibit creation to evolve organically through the listening sessions.

Our lead professional collaborators brought with them significant knowledge and skills in relation to the case-study object types: Caro C is an electronic music educator and the organiser of the Delia Derbyshire Day charity; Nina Richards is an expert in synthesiser technology and a member of the Yorkshire Sound Women Network; and Aleksander Kolkowski has exhibited historical sound postcards and is a previous artist/composer-in-residence at the British Library and the Science Museum. At the listening sessions, they shared their knowledge through active demonstration and sounding, inviting their groups to engage in close listening to objects, responsive sounding after listening, and then in discussion of listening. The Echo and Sound Postcards groups had their first listening sessions in the Museum in March 2020. The Echo group spent time looking at the echo units in the Museum's collection (Figure 5) before hearing from Mandeep Samra, who is an expert on West Yorkshire sound-system culture, and MC Dee Bo General. They jointly offered an introduction to the use of echo in dub culture and in the art of vocal MC-ing. As Samra spun dub plates on the vinyl deck, MC Dee Bo General, with his microphone running through a modern digital echo unit that was selected to replicate the museum collection objects (see Figure 6), began to demonstrate how the functionality of the echo unit – speed, feedback and echo level – were deployed in practices of toasting, a form of rhyming that emerged in Jamaica and is widely understood to have prefigured rapping (Figure 7). Dee Bo demonstrated several examples of 'licks' that MCs would use to punctuate the playback of dub records. As he called these over a track, he filled the space in between them with improvised verse, demonstrating the use of echo effects ([Sound Clip 1](#)).

The audience group was invited to write their own rhymes and perform them to the rest of the group while deploying echo effects. Audience approaches to this challenge were varied, representing a diverse selection of creative and explorative approaches to the echo unit: one person chose to recount their experiences and memories of echo while manipulating their voice through the echo machine. Another person made a range of percussive mouth sounds and Dee Bo fed in with a range of suggestions for manipulating these sounds. Another member spoke into the mic to verbalise their exploration of the echo unit, reading out the names of the controls as they manipulated them. Their 'toasting' involved laughing as the music played and exclaiming "this is so much fun," before breaking into song: "I'm a Jazz Woman [...] I'm a Jazz woman [...] I'm a Bradford woman [...] I'm a BCB Woman." (BCB stands for Bradford Community Broadcasting. Several members of the audience group were volunteers at this local community radio station.)

Figure 5



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The Echo audience listening group spent time looking at several echo effect units from the collection of the National Science and Media Museum at the first, in-person listening session held at the Museum in March 2020

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Figure 6



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A Strymon Volante Magnetic Echo Machine used for demonstration purposes at the first listening session of the Echo listening group in March 2020

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Figure 7



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MC Dee Bo General offering a toasting workshop with Mandeep Samra at the first Echo listening session in March 2020

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At the first Sound Postcards listening session Kolkowski introduced the group to a collection of vintage sound postcards (Figure 8) laid out beside a turntable and loudspeaker. On an adjacent table was an array of apparatus including a 1960s Cartavox vinyl lathe (Figure 9), a lamp, brushes, kitchen roll and a hairdryer. Tracking back to the turn of the twentieth century, Kolkowski gave a survey of early self-recording technologies, including the *Phonopostale*, a self-recorded sound-postcard medium originating in France, and voice records that would have been recorded in coin-slot operated booths and either cut onto metal or lacquer disc. Moving on to sound postcards that were cut in their thousands as souvenirs, pop music recordings or commemorations, Kolkowski played such editions as 'Sights and Sounds of Canterbury' and a 1981 Charles and Diana wedding commemoration postcard (Figure 10). Kolkowski touched on the clandestine use of sound postcards in Eastern Bloc countries in the Soviet Era as a means to proliferate contraband recordings of western pop music. He then introduced the 1960s Cartavox recording machine. Completely automatic, and with a colourful, retro-futuristic interface, the machine had a short-lived life as a domestic technology that allowed users to record their own sound postcard from a live recording. Kolkowski went about engaging audience-listeners in creating a series of instantaneous disc recordings onto blank sound postcards. First, as he warmed a blank disc with a hair dryer, the group were assembled in a V shape around a microphone to make a 90-second crowd sound recording. Firing up the Cartavox, Kolkowski engaged the group to make a series of animated jibber-jabber sounds beginning softly and slowly swelling in volume until they reached cacophony. As these sounds were emitted, Kolkowski stood over the machine with a swarf brush, industriously clearing the hair-like strands of vinyl produced by the cutting process. When the recording ended, Kolkowski blew the swarf away from the disc, placed it on the vinyl deck and played it back to the group. Audience listeners watched the disc spinning on the deck, audibly animated to hear their sounds replicated through this antiquated technology, heard as though they were returning from the past. The group examined the marks left by their voices on the acetate during the recording process, running fingers over the imprints and feeling the materiality of their sonic signatures on the medium.

Figure 8



© Alex De Little

Aleksander Kolkowski demonstrating a collection of vintage sound postcards at the first sound postcards listening session in March 2020

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Figure 9



© Alex De Little

Cartavox vinyl lathe recording machine, 1960s, as used at the first sound postcards listening session in March 2020 (Personal collection of Aleksander Kolkowski)

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The first Radiophonic Workshop listening session took place online as a video call after the closure of the Museum. Partly because of this online format, the professional collaborators attached this strand of the project, musician and educator Caro C and creative technologist David Boulton, chose to focus not on the individual objects in the Museum's collection, but rather on the atmosphere of innovation at the BBC Radiophonic Workshop, particularly the techniques of tape cutting, splicing, reversing and speed-changing that would have been used to manipulate the recordings of objects in the Museum's collection, involving variously changing the pitch, speed and envelope of the source material for musical effect, often beyond intelligible recognition. The listening sessions attached to this strand of the project were attended by children aged between 7 and 11 and their families. Setting it in the context of the BBC's desire for inventive sound and music to accompany its television productions in the 1950s and 1960s, Caro C introduced the work of the BBC Radiophonic Workshop at the first listening session. She played a composition by Delia Derbyshire which used everyday objects and field recordings to make music through tape recording and manipulation. She explained that, during the listening sessions, the children would be making music in this way. Because of the delayed start to this strand of the project caused by the pandemic and the challenge of delivering online object-based listening sessions to children, Boulton and Caro C created a version of their prototype exhibit in advance of their first listening session to provide a focal point and tool for engagement.

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Iterative community exhibit prototyping

The Radiophonic listening group thus led the way in the project's transition to digital. Boulton proposed the idea of developing an online exhibit prototype called Photophonic that would use machine learning algorithms to analyse the vertical lines in an image and to use a cursor that moved across the image to trigger sounds based on the location of those vertical lines. The idea was to reproduce the atmosphere of auditory innovation present in the work of the BBC Radiophonic Workshop by allowing users to create music with everyday objects represented in an image. Caro C, responsible for the sonic elements of the

prototype, selected sounds that referenced objects and sound sources used by the BBC Radiophonic Workshop. She recorded a series of found sounds, including clanging cutlery, clinking glasses and a metal lampshade that closely resembled the one in the Museum's collection. She also sourced sounds from the British Library Sound Archive, including bird calls and frog species from around the world. Built into the prototype was the ability for the user to manipulate these sound samples before they were triggered in relation to the image, using techniques similar to those used at the Radiophonic Workshop. Users were able to reverse a sound, change its frequency, or trim the sound to select either its beginning or end. The listening sessions got straight to working on this prototype.

Our intention had always been that the professional collaborators on the Sonic Futures project would build multiple versions of their exhibit prototype, bringing it back to the audience listening group for testing, further listening sessions and onward adaptation. We wanted the exhibit prototypes to emerge gradually as the audience listening groups developed a growing understanding of the history of their allocated sound technologies and as the professional collaborators learned more about the listening habits of their audience groups. In the Radiophonic listening sessions, audience listeners were introduced to Photophonic in their first meeting. Boulton explained how to use the prototype. After an initial five-minute period of playing with the interface, the children commented that they enjoyed the experience, especially the ability to make sounds faster or slower, and that they generally found this music-making experience more engaging than the sound editing engagement. They enjoyed the ability to edit sounds on their own in a focused way, but preferred being able to 'jam' together in the image-sonification stage. In a phase of questions following this experience, when asked to describe what they had been doing, they said that they had been "interpreting the music from a photo," "describing music from a picture," or simply "making music." Following the insights gained from the first listening session, especially the children's preference for and enjoyment of 'jamming' together, Boulton developed the prototype to allow multiple, distributed users to experiment and improvise with the sounds simultaneously as well as several other refinements to the interface, including the ability to use a smartphone to control the manipulation and selection of sound sources from within an improvisation. Photophonic might have become an educational sound editing tool, but instead it became a multi-user musical instrument, allowing online users to enter, jointly and collaboratively, the creative world of the BBC Radiophonic Workshop. The listening group reconvened to experiment with the updated interface. Following introductions, the children launched into an improvisation with the tool that lasted over ten minutes.

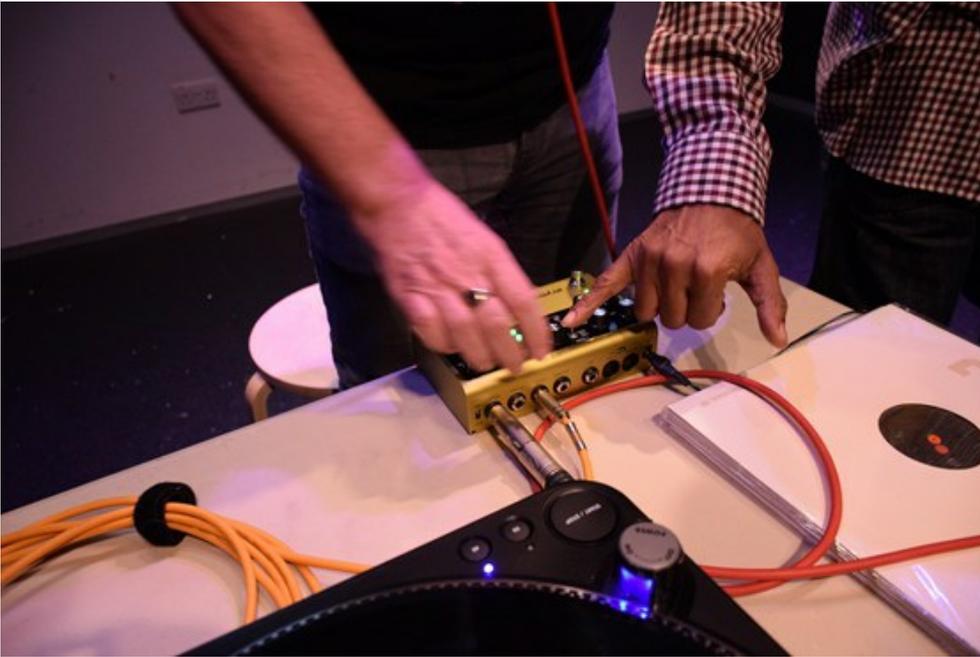
Video 1

Video of group members 'jamming' online using the Photophonic prototype exhibit live during a video call listening session in Summer 2020 (https://mediaspace.nottingham.ac.uk/media/Sonic+Futures+Photophonic+Jam/1_t5byi5bm)

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We also wanted our audience listeners to gain a sense of agency as listening experts aware of their role in curating imagined future museum exhibits. Although the professional collaborators would do much of the actual exhibit building, audience listeners had control over shaping the direction of the listening engagements they were involved in creating. In the case of Photophonic, the children advocated for the centrality of 'jamming' together as the key listening mechanism. In the case of the Echo listening group, Nina Richards designed an interactive workshop via an Ableton Live demo using an echo unit. As audience listeners explored and manipulated the interactive echo Ableton Live set, experiences, insights and engagements spun off into conversations and discussions about the future exhibit prototype (Figure 10). One listener mentioned that any future exhibit on echo should be "instantly fun"; another mentioned that due to the amount of touchscreen interfaces available in the present day, it was crucial to engage audiences in the physicality of manipulating the kinds of knobs and sliders present on the original echo units. During this phase, audience-listeners were invited to record their ideas through drawing and explaining their ideal interactive interface for an echo unit prototype exhibit (Figures 11 and 12). What seemed to capture the group's imagination was the prospect of museum visitors performing with an echo effect exhibit and being overheard by others in the gallery. Having enjoyed the toasting experience led by MC Dee Bo General, they wanted to re-create something similarly social for the Museum. Their aspiration for the future museum was that it should be a place for *sounding* as well as listening.

Figure 10



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The Echo listening group interacting with the Strymon Volante Magnetic Echo Machine as part of an Ableton Live demo organised by Nina Richards

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Figure 11

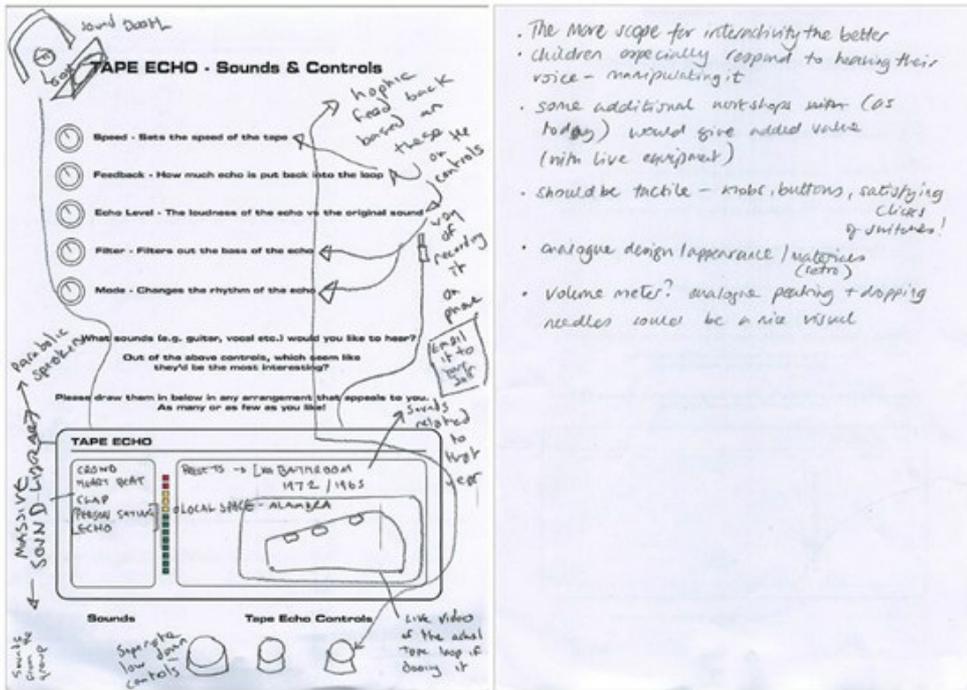


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Audience listeners collaborating in prototype design discussions and capturing these discussions on exhibit prototype worksheets designed by Nina Richards

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Figure 12



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Example of a completed audience listener worksheet from the initial phases of the Echo prototype exhibit design planning

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Following the onset of the pandemic, a decision was taken to follow the example of Photophonic and make the Echo exhibit prototype an online interactive experience that could be further developed in video calls with the listening group. At the first online meeting of the group in April 2020, listeners talked through the tensions, possibilities and issues involved in translating the planned physical, gallery-based interaction to a web-based interface. The notion that the interaction might be less embodied and that there might be less of an opportunity to be 'performatively overheard' than in a gallery setting was discussed, but also the possibility for potential downsides to be offset by being able to record and share interactions over social media, to be able to record and manipulate recordings of one's own voice using microphones on personal devices, and to be able to engage with the exhibit anywhere in the world online. The prototype exhibit created by Richards, The Echo Machine, took these ideas into account. It included a range of pre-set sounds inspired by key musical references relating to the use of echo effects (some of which were suggested by members of the group), a record function, and the possibility to share interactions across social media and from device to device.

Video 2



© Nina Richards

Video produced by Nina Richards demonstrating the functionality of the Echo Machine exhibit prototype. The video was used to explain the prototype exhibit to listening group members and online public users

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After offering points of feedback on the interface, the group were invited to spend time with the prototype and record their interactions. Following the experience of listening, the first online prototyping session closed with the proposition of further points of refinement or expansion, such as the possibility to include multiple tracks and strategies to explain the exhibit to the museum-listener. Richards's refined prototype took much of this feedback into account and was presented to the group in a final online listening session.

The Sound Postcard listening group took a different approach to prototyping, led by the ideas generated at its first in-person listening session. Following Kolkowski's demonstrations, the group decided that in order to prototype an exhibit about sound postcards, they would first need to experience the domestic listening involved in this obsolete technology for themselves. They decided to each create a sound postcard and send it to another group member in the post. One audience listener mentioned that aside from the production of an artefact, this process could act to re-orientate the listener, causing a slowing down and offering the possibility to re-address practices of engagement with existing sound technologies, such as WhatsApp voice messages. Members of the listening group created an image (either drawn or photographed) and recorded a sound using their smartphone. They sent these to Kolkowski, who pressed the images and sounds into a new, physical sound postcard. These were sent out to group members who in turn wrote messages on them and posted them via the mail to others in the group. Members then assembled on Zoom for a listening party, to hear, see and present their creations. In place of making an exhibit that engaged the user in the process of creating sound postcards as originally suggested, the group decided that their next step would be to exhibit their new sound postcards by means of an interactive online sound postcard player to recreate the physical experience of listening to the sound postcard medium. The digital exhibit was produced by creative developer Laurence Cliffe. The selection of sound postcards is displayed on screen in Cliffe's exhibit design. The user selects a postcard which is mounted on the virtual player and begins to spin as the listener experiences the onset of the familiar vinyl crackling noise. As with vinyl, the listener cannot skip through the recording but can only remove the card and select another.

Video 3

Screen recording demonstrating the functionality of the Sound Postcards exhibit prototype designed by Laurence Cliffe. The site features a digital record player which loads digital versions of the physical sound postcards made by listening group members (https://mediaspace.nottingham.ac.uk/media/Sonic+Futures+Project+Sound+Postcard+Gallery/1_gwn463ya)

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Listening demonstration

The third stage of our methodology was to ask the audience listeners to present their work to a wider public through listening demonstrations. The idea was to cement the audience listeners' growing sense of curatorial agency and to draw on their new advocacy power to engage a wider museum listening community. We had originally hoped to do this in the Museum itself, but because of ongoing lockdowns in the UK, this stage, too, had to be delivered digitally. All three exhibit prototypes were launched online via the Museum's website. Visitors, near and far, could play with Photophonic, hearing their interactions alongside other web visitors. They could use the Echo Machine, record their interaction on it, and share their echoes on social media. They could visit the Sound Postcard gallery and receive a digital postcard created in the strange sound world of the UK's first Covid lockdown. By this point, the Museum was running another digital engagement project called [#SonicFriday](#), led by researcher Stefania Zardini Lacedelli. Each Friday the Museum would host social media exhibitions and online interactive tasks, such as sound map building, on its Twitter, Facebook and Instagram accounts to keep audiences engaged during lockdown.

The three Sonic Futures prototypes were launched via listening demonstrations on social media as part of [#SonicFriday](#). These demonstrations consisted of a series of educational posts about the featured sound technologies and an invitation to explore the new exhibit prototype online. Echo audience group members wrote [blogs](#) on the Museum's website to accompany the launch, detailing their input into the creation of the Echo Machine, curated a Twitter thread of echo-related content, and co-ordinated online sharing from the Echo Machine.

Video 4

Screen recording showing the Twitter exhibition which accompanied the public launch of the Echo Machine. The exhibition took place on the Twitter account of the National Science and Media Museum ([@MediaMuseum](#)) (https://mediaspace.nottingham.ac.uk/media/Sonic+Futures+Twitter+Echo+Exhibition/1_es73fh3l)

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Photophonic was also launched via Twitter thread, along with an educational video by Caro C.

Video 5

Screen recording showing the Twitter exhibition which accompanied the public launch of Photophonic. The exhibition included a video featuring Caro C explaining the background of the BBC Radiophonic Workshop and the functionality of Photophonic. The video featuring Caro C was produced by Busha Productions (https://mediaspace.nottingham.ac.uk/media/Sonic+Futures+Twitter+Photophonic+Exhibition/1_pzcsima)

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The Radiophonic Workshop group members fed into the design of a live online family workshop using Photophonic delivered on Zoom as part of the Bradford Science Festival, setting the stage for an ongoing programme of hybrid in-person/digital sound workshops run by the Museum's Learning Team. The Sound Postcard group launched their exhibit via a takeover of the

Museum's Instagram account.

Video 6

Screen recording of the Instagram takeover of the National Science and Media Museum Instagram account ([mediamuseum](#)) which accompanied the public launch of the Sound Postcards exhibit (https://mediaspace.nottingham.ac.uk/media/Sonic+Futures+Sound+Postcards+Instagram+Takeover/1_wvuqrtmw)

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The Sound Postcard demonstration showed the power of allowing an audience group into the curatorial process. The Sound Postcard Gallery and Instagram takeover amounted to much more than an educational display about the technological history of postal phonography. The listening group re-activated the sound postcard as a medium, bringing it back to life in a very direct way. The resultant exhibit prototype and Instagram demonstration captured something of the essence of the technology, but also of the listening attention cultivated by the audience listeners. Their listening is present in the exhibit in ways that are rarely achieved in museum digital interactives.

Asking the audience listeners to publicly present their work in these ways was also a form of evaluation for the project. As the groups blogged, created Instagram posts and Tweeted, we learned about how they had listened. We supplemented this with surveys distributed to the listening group members and with follow up focus group meetings to learn about their new perspectives on museum listening. The Sound Postcard group, for example, felt that the experience that they had been through together, of investigating and sharing experiments with a historical sound technology, should be replicated in the Museum. Participants were particularly keen on the idea that museums could become places where visitors share sounds with one another. One commented that "having gone through the process of producing the sound postcard, I think you start thinking about sound not just as something you receive, but something you can transfer to other people. So it becomes a question of selecting and curating almost." Another thought that sound postcards could become something that visitors create for themselves in museums as a memento or a gift: "I thought a sound postcard could be an interesting thing to take from the museum or make at the museum and then send it to someone." This idea of the museum as platform for sonic sharing was mirrored in the feedback from the Echo group. One group member, for example, suggested that a version of the Echo Machine installed as a museum interactive exhibit could store previous visitors' interactions and make these available as pre-recorded examples.

All three exhibit prototypes were also evaluated in their live public demonstration phase. An online survey was attached to each prototype website. The feedback on these surveys allowed us to understand the wider public engagement with the project. For example, comments on the Sound Postcard Gallery allowed us to understand that users appreciated learning about an obsolete technology but also enjoyed doing so in the digital company of our listening group, whose sounds and images were on the postcards. One user commented that, "though my interaction was completely mediated by the web the animation definitely helped remind me that the technology was analogue," while another added that they enjoyed, in the context of lockdown, "The glimpses into other lives and experiences through sounds. I felt like I was in a museum, a nice memory!" We also learned that users appreciated the ability to record their own sounds on the Echo Machine, rather than just use pre-set sounds. One user commented that they particularly liked "The ability to record your own sound," which they thought helped to "contextualise the effect [of echo] on immediate audio recordings." Such feedback helped us to conceptualise the idea of the *listening scenario*. Our Sound Postcard group had created not just an opportunity to listen, but also a framework of reproduceable museum listening actions tied to the specificity of a particular form of sound technology. The scenario of recording a sound and making an image for the purposes of gifting an obsolete sound technology to a friend or family member was not just a one-off activity for our Sound Postcard group members, but something they wanted to see reproduced in some form as part of future exhibitions.

The final piece in our demonstrating phase methodology was web analytics. We realised that presenting exhibit prototypes online rather than in the Museum yielded the opportunity to track engagement in different ways. We gathered standard web analytic data, such as user location, but also custom information, such as the length of time users spent interacting with different parts of the Echo Machine and how often they chose to save and export interactions to social media. Our aim here was

to assess the utility of custom web analytics in the museum exhibit prototyping process, especially where listening engagement is concerned.

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3. What we found: recommendations for a sound-considered museum

The Sonic Futures project generated research data in the form of audio and video recorded at listening sessions, survey results, focus group transcripts and web analytics. In addition to the focus groups and surveys conducted with the listening groups and the public users of the online exhibits, we conducted a focus group with the professional listeners who worked with us on the project so that we could learn from their insights. We also interviewed staff from the National Science and Media Museum to gauge the impact of the project on their work. Rather than provide a full and exhaustive analysis of the data we collected, instead we offer here a series of recommendations drawn from our experiences on the Sonic Futures project aimed at museum professionals and researchers who are involved with or interested in museum listening.

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Museums should listen with their visitors

We advocate for a culture of museum listening based on an equal and reciprocal relationship between curators, creators and visitors. Although museums have a duty to teach their visitors about the culture and science of sound, they should do so without privileging a singular listening perspective, such as that of the curator or a typical expected visitor. Our listening groups showed us that, even within our three audience segmentations and age demographics, group members came to us with different musical tastes and interests and different ideas about what kind of sounds should be audible in museums. As our three groups worked together, they took different paths towards the listening scenarios they wished to cultivate. Our Echo group, consisting of older adults with an interest in sound technologies, thought of the Echo Machine exhibit prototype as an opportunity to re-sound their various musical and spoken word enthusiasms. Our Sound Postcard group, made up of younger adults with an interest in attending arts events, were seeking opportunities to connect with one another through shared experiences of sound. Our Radiophonic Workshop group, representing the Museum's child age visitors, valued extended opportunities to play while listening. The professionals collaborating with us on the Sonic Futures project took these perspectives into account as they designed the exhibit prototypes. What they each created captures something of the essence of the Sound Technologies Collection objects assigned to the listening groups, but also the different dynamics of the listening and listeners involved.

We came to think of these dynamics, cultivated through the listening sessions and deposited in the exhibit prototypes, as *signatures of listening*. Our Echo group's listening signature was nostalgia for music and live music experiences from the past. As the listening sessions unfolded, group members regularly responded to and engaged with echo effects based on memorable experiences, either events that they had attended where echo effects featured or experiences of working in or performing music that involved echo. They wanted to re-create the excitement of these experiences with an exhibit that simulated live performance and where museum visitors would be drawn into the atmosphere of listening and sounding together. The Sound Postcard group's listening signature was based on sharing intimate and personal experiences of listening and on community building. In response to the uncertain time of the Covid pandemic, members of this group, whose university courses or places of work were more significantly affected than other project participants, seemed to find an element of sanctuary in the processes of listening and sharing with one another brought about by the project. They engaged the medium of the sound postcard to let others into their perception of the unique lockdown moment in which the project took place. One group member said that, "in this time, in particular, I think it's really special that sound brings people together."

It was noticeable that the listening signature of the children who took part in the prototyping of Photophonic grew less directly from information we provided about the BBC Radiophonic Workshop and more from a desire to experiment freely during the jamming phase of the listening sessions. Constantly shaping sounds and manipulating parameters, the children – distributed physically and geographically – were brought together in responsive and contingent engagement with Photophonic, locating themselves in rhythmic and spectral space, asserting their own sounding aesthetics and ideas while recalibrating them in

response to one another. This signature of listening transcended the verbal. Unhindered by inhibitions, the children's approach to sounding and listening enabled a musicality and depth of playful engagement with the sounding affordances of the exhibit that was not present in either of the other two project strands. This signature of listening was self-perpetuating and open-ended, fuelled by interest and intrigue, by group dynamics and by playfulness. Caro C noted that the children's willingness to jam for ten minutes using Photophonic confounded her expectations about the duration of time that children would spend playing with digital interactive exhibits. She wondered whether being online on a personal device at home (rather than in the Museum on a communal touch screen device) had played a role in the children's longer than expected engagement with the jamming activity.

These divergent signatures of listening demonstrate that museum visitors are likely to seek different kinds of listening scenarios in museums and that there is significant value in co-designing these listening scenarios with audience listening groups. Doing so will allow museums to cater for a diversity of listening dispositions. Sterne and De Luca's (2019) insistence that 'In museums, there is no hearing subject' (Sterne and De Luca, 2019, p 301) is a reminder that visitors from different backgrounds and at different life stages hear and value sounds in different ways. By representing a variety of forms of listening, the sound-considered museum can provide listening scenarios for visitors of different backgrounds, but also allow them to listen through one another's ears. For example, people who did not experience first-hand the arrival and development of the new musical genres made possible by echo units may benefit from encountering it in a listening scenario designed by those who did. This could facilitate in the museum what Dylan Robinson (2020) calls 'guest listening', the ability to hear the world through other people's ears without imposing our own listening modes on those people or their sounding cultures. Robinson is writing about how non-indigenous scholars should approach listening to indigenous music in Canada, but the principal of facilitating a guest-like presence for listeners encountering each other's sounds is an idea which we think should be adopted in the sound-considered museum.

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Listening connected to museum objects should be interactive

When it comes to engaging visitors with sounding objects in museums, sound on its own is not enough. Interacting with an object's *sounding function* allows visitors to understand the listening techniques associated with objects and to replicate those techniques in exhibitions. Griffiths (2008) shows that science and technology museums have offered visual demonstrations of the inner workings of machines since the nineteenth century but that they have tended to draw on sound for its immersive power rather than its ability to teach visitors about technical or historical listening. The first listening sessions on the Sonic Futures project showed us that audiences not only want to hear what sound technology objects sound like, but that they want to *operate* them, too. The object's function – how it works – was viewed by listening group members as intrinsically connected to the sound that it makes. Experimenting with a working Strymon Volante Magnetic Echo Machine led our Echo listening group to conclude that an exhibit about echo units should provide listeners with the opportunity to *hear their own engagement* with the technology rather than simply hearing examples of music that contain echo effects. A further key finding of our Echo strand was that the audience group wanted to be able to record and manipulate their *own voices* as well as pre-set sound effects in their prototype. They wanted to create an embodied relationship between the Echo Machine and themselves. The Echo listening group absorbed what was important *to them* from the echo unit objects they encountered at the National Science and Media Museum and devised an exhibition listening scenario based on a highly personalised and live performance-based interaction.

The evidence we collected demonstrates that listening *with* objects, even when it is not possible to listen directly *to* them, can significantly enhance public understanding of sound technology artefacts. The Sound Postcard listening group engaged in the most sustained listening with their allocated technology. Findings generated from this group suggest that members valued incremental interaction with the process of sound postcard making and listening. Hearing their digitally recorded audio transferred to and then played back on a new vinyl record attached to a postcard, especially as a remembrance of the early weeks of the Covid pandemic, deeply affected members of the listening group, who described their listening party as creating, "Fascination, amazement, wonder – even though we are so used to recording sounds and listening to them on our phones." Another said there was, "A sense of intimacy and warmth, through the lo-fi crackling quality, and in itself the action of placing the postcard onto a record player to re-live the captured moments recorded earlier in lockdown." Something as simple as transferring a digital audio file to a vinyl record can powerfully demonstrate the communicative function of a technology like the sound postcard. The act of sending and receiving the sound postcards was also highly valued by the group. It brought home

to one group member that, “The ability to then share physically the postcard, which traverses actual land masses and time zones seems very grand, and yet it’s how ideas and objects used to travel, without digital aid.” We conclude that listening can form an alternative mode of pedagogy in museums. Looking at objects can achieve a great deal, but listening to or with them (in the way that we did in the Sound Postcard group) can produce different ways of encountering the auditory worlds of the past and the present, ways that foreground the role that hearing and listening play in our mediated cultures of space, time and community. One Sound Postcard group member noted that, “I didn't know there was such a thing as a sound postcard before I got started on this project,” but that, by the end, their new insights were about the slower speed and different materiality of communication in the past: “This is something people used to do back then.”

It is notable that the interactive listening scenarios created by our listening groups generated a form of interactive listening that included *sounding* as a central component. The Echo group’s record and share function on the Echo Machine, the Sound Postcard group’s capturing and sharing of everyday audio snapshots, and the Radiophonic Workshop group’s extended jamming were forms of museum audience *sounding* caused by the new forms of listening that we developed in the listening sessions. The listening scenarios which form the basis of each Sonic Futures exhibit prototype are thus also sounding scenarios, and we propose that a fundamental part of the future sound-considered museum should be creating platforms for visitor *listening-sounding scenarios*: the museum might, in other words, become a platform for visitor-created or visitor-selected sound shaped by pedagogical experiences of listening.

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Digital listening can lead the way to the hybrid museum

The Covid pandemic forced the Sonic Futures project toward a greater degree of digital working than would otherwise have been the case, but the consequence was that we learned a good deal about creating, testing and sharing online digital exhibit prototypes. We concur with Eric de Visscher (2018) that ‘Sound is particularly well-suited for the development of the “digital museum” and should be used as such in all possible ways’. Photophonic tested the principal of an exhibit that could be deployed simultaneously in a physical exhibition *and* online. With such an exhibit, users in the museum and users online would be aware of one another’s presence, hearing each other’s interaction. Such an exhibit could act as an interactive online trailer for an exhibition, allowing would-be exhibition visitors to begin their learning before a visit to the museum and then to deepen it with further opportunities to interact with the exhibit while in the museum. They could of course also continue using the exhibit online after the museum visit. We used Photophonic in online educational workshops for school children who were not able to visit the National Science and Media Museum during lockdown. Web-based exhibits such as Photophonic could provide opportunities to extend school museum fieldtrips into the classroom before or after a physical visit to the museum. Photophonic’s web-based approach represents a new avenue for museum listening and for museum digital interactives, which are usually stored on computing devices inside the museum rather than on web servers. One of the insights we gained about listening scenarios in museums is that these can be enhanced by web platform technologies which blur the listening that happens within and outside the museum building.

The other key insight gained from the Photophonic prototype was that digital web-based listening exhibits can act as platforms for novel forms of public engagement with audio archive materials. The National Science and Media Museum’s lack of audio archive collections is a barrier to the interpretation of its Sound Technologies Collection, but what such a museum *could* usefully do is to create platforms for listening to *other* institution’s archived audio. Local, regional and even national audio archives often lack the space, infrastructure and expertise to undertake exhibitions and other forms of public engagement. Museums have these things in abundance, but often lack audio collections. Photophonic used British Library Sound Archive audio as its built-in sound effects. While only a small number of audio files were used in the Photophonic prototype, a much wider scale distribution of audio archive sounds could be achieved via digital web exhibits such as Photophonic and the Echo Machine. These would allow users not simply to listen to historical audio connected to objects in museums, but also to manipulate and re-shape that audio while learning about past sound cultures.

Further, the Sonic Futures project caused curators at the National Science and Media Museum to consider the value of initiating a recorded audio collection of their own and, in particular, to pursue a policy of allowing visitors to record and share audio as part of their response to exhibitions and objects. This approach could involve what might be described as local and regional

auralisation of sound technology objects. This would involve connecting widely used objects such as the Watkins Electric Music Copicat Tape Delay to local/regional memory and music culture via sound recording of voices and music performances. Collecting visitor responses to sound technology objects in the form of audio recordings would fulfil Kannenberg's recommendation (2017) that museums should collect 'sound objects' as well as physical objects. For Kannenberg (2017), a sound object is 'a listenable sonic event generated by a physical object, animal, human or force of nature'. Using silenced objects in the Sound Technologies Collection to prompt such listenable sonic events was an approach we trialled on the Sonic Futures project and is something that we think could fruitfully be taken up as a way of working at the National Science and Media Museum and at other museums with sound-related collections.

The kind of digital prototyping that we deployed on the Sonic Futures project could also provide a model for co-production and iterative exhibit design in the future sound-considered museum. Bringing audiences into the curatorial process of collecting and displaying is now a priority for many museums and doing so using digital tools such as video calls, social media, smartphone audio recording and sharing, online digital exhibit testing and web analytics data collection can widen participation in this process. Digital solutions will not be the answer in every situation: there will be many kinds of projects and audience groups who will continue to benefit from in-person working, but our experience on the Sonic Futures project was that meeting audiences online, and allowing them to work with online tools, allowed for more flexible modes of co-working than would have been possible if we had tried to gather people in a room at the National Science and Media Museum. Most museum digital interactives are not co-designed with audiences, but the way of working we developed on the Sonic Futures project shows that more of them could be in the future, especially as familiarity grows with video call and social media connectivity. Initial review of the web analytic data we collected from the exhibit prototype websites on the Sonic Futures project suggests that exhibit developers could usefully adapt their products considering information gathered in this way. Such analytics could be used for functionality improvement purposes, but also to enrich digital interactives with the presence of local, national and/or global user communities prior to installation in exhibitions.

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Listening and sounding in the museum can operate as a form of institutional renewal

Many visitors to the city of Bradford arrive at Bradford Interchange bus and train station where, since 2012, classical music has been played over loudspeakers to 'stop groups of young people loitering' because 'It is thought playing classics rather than pop or easy listening might make them decide to hang around elsewhere' (Meneaud, 2012). If sound has the affective power to disperse and divide in this way, it also conversely has the power to unite and connect people. Explicitly inviting different kinds of people to listen and sound in the museum is a powerful invitation to connect and dwell. Listening scenarios are dwelling scenarios in the sense that they give people a reason to stay, engage and learn. When museum listening scenarios also produce responsive sounding, as they did in each of our exhibit prototypes, visitors become audible, and present, in museums. This audible presence has historically been viewed with suspicion by some museum curators. Griffiths (2008) and Rich (2017) both draw attention to the fact that gramophone music demonstrations at the Science Museum during the 1930s raised concerns among some curators about visitors dancing in the gallery spaces, an activity thought to be incompatible with the educational purpose and cultural stature of a national museum. But this kind of dwelling-through-listening is now much more aligned with the priorities of museums as they seek to engage with diverse kinds of visitors. Griffiths (2008) argues that, from the late nineteenth century to the early 2000s, museum exhibitions were increasingly modelled on the visual culture of department store windows. What if, rather than the shop window, museum spaces came to embrace instead the auditory cultures of recording studios and live music venues? Influenced by ways of working developed on the Sonic Futures project, that reality is beginning to emerge at the National Science and Media Museum where the 'Sonic' and 'Boom' exhibitions in 2021 embraced activities such as synthesiser patching and demos.

Among the most significant insights gained on the Sonic Futures project was that audible visitor presence could be the very thing to sonically enliven silent objects. The listening scenarios we created were organised around the idea of *listening with* objects rather than to them; we invited auditory responses which became the soundtrack of silent objects. The suggestion that the National Science and Media Museum could consequently begin collecting digital audio from visitors in response to Sound Technologies Collection objects reflected the extent to which visitor listening-sounding came to be viewed as a new paradigm of

public engagement for the Museum. The Sound Postcards group showed that there are also ways of collecting digital audio that connect listeners to past as well as present media formats. With the right kind of direction, visitors can learn about the past auditory lives of objects in museums, but museum listening scenarios such as our Sound Postcard exhibit are also opportunities for visitors to hear one another, for the museum to hear its public, and for new public cultures of listening to form. These insights have helped the curatorial team at the National Science and Media Museum to reconsider the primacy of preservation in their work. A Senior Curator told us that the Sonic Futures project had helped them to see that a museum of media technology should embrace opportunities for “transmission” as well as preservation, by which they meant opportunities to create and disseminate audio, visual and audio-visual content. “Historically, the museum has focused on broadcast media technology rather than media content,” the Curator noted. In the future, the Curator hoped, the museum would seek to collect digital sound archives, including sounds created by visitors, as part of its mission to preserve the cultures surrounding sound technologies.

Experimenting with new listening scenarios can also impact museum organisations beyond the immediate activities of their curatorial and exhibitions departments and serve as a form of institution-wide renewal. Some of most fruitful interactions during the Sonic Futures project were with staff from the marketing and communications and learning departments at the National Science and Media Museum. Embracing listening as a mode of public engagement provided a new way to think about the Museum’s online community. The web and social media team were able to extend our listening scenarios to platforms such as Twitter and Instagram and these platforms in turn became spaces of sonic exhibition and learning for the Museum in ways that they had not previously been. The shared purpose of engaging audiences in listening brought the social media and curatorial teams together in a new shared dialogue where previously their work had tended to take more separate paths. A communications officer at the National Science and Media Museum told us that, whereas they had previously tended to create social media content themselves, they now planned to create digital content in collaboration not only with curators but also with external collaborators, including audience members. This would make the Museum’s social media channels an extension of exhibitions and collections activities rather than just an advert for them.

The learning staff at the Museum adopted the Sonic Futures listening scenarios for school and family workshops. Photophonic and the Echo Machine worked just as well for standalone educational events as they did as potential gallery exhibits, and both were used as the basis of online workshops at the Bradford Science Festival 2020 organised by the Museum’s learning department. The Bradford Science Festival would usually be held in person in the Museum, but in 2020 it had to be transferred to Zoom calls because of the Covid pandemic. Photophonic and the Echo Machine formed the basis of successful video-call workshops at the Festival. A Learning Manager at the National Science and Media Museum told us that, “This was the first time the National Science and Media Museum had done workshops with communities in Bradford in this way and they were very popular with our audiences.” This led the learning department to use Photophonic and the Echo Machine as the basis of video-call based remote school group visits which took place in school classrooms while the Museum was closed. The Learning Manager commented that, “Teachers often find sound hard to teach beyond the traditional format of musical instruments, so it is our intention that the Sonic Futures interactives will not only enable families to engage with sound at the National Science and Media Museum, but that they will become a valuable resource for classroom teaching as part of the Museum’s engagement with schools.”

Museum listening scenarios, in other words, can be deployed within but also beyond gallery-based exhibitions, re-shaping communication, education and more, in the museum. As Sonic Futures principles connected with people in different parts of the National Science and Media Museum, we gained a sense that listening was re-shaping the Museum and its purpose, leading to a museum of the future that will be a platform for sonic communication as well as a place for looking.

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Tags

- [Public engagement](#)
- [Museum collections](#)
- [Audience research](#)
- [Participation](#)

- [Co-production](#)
- [Research in museums](#)

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