

Interactive comment on “Developing the hertz art-science project to allow inaudible sounds of the Earth and Cosmos to be experienced” by Graeme J. Marlton and Juliet Robson

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Reviewer 2: We thank the reviewer for their comments and respond to their comments below:

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"In essence, this article aims to record the creative collaborative process between an artist and a scientist by documenting the research development of a project and its dissemination, with a particular focus on public engagement and a lay-person's interpretation of a potentially awe-inspiring science-based art installation. The central pivot to the project is the use of infrasound to encourage individuals from diverse age groups and backgrounds to consider the continual 'invisible' movement and vibrations generated by natural and man-made activity within our planet – to reveal the imperceptible. This ambitious idea for an interactive installation is detailed by the authors as follows: Drawing on the premise that everything vibrates, from the smallest atom to the furthest star, their frequencies surround us and yet leave no imprint, hertz would enable people to feel their bodies resonating to the inaudible symphony of our own planet and experience the stars singing and see their sound made visible. hertz's ultimate goal would aim to reconnect us to our planet and place in the cosmos. (68-71) From an artistic perspective, the conceptual structure underpinning the gallery installations created through the project is rooted in ideas of 'the uncanny' and 'the sublime', postulated by philosophers such as Edmund Burke and Immanuel Kant, and demonstrated by artists such as Walter de Maria, Bruce Nauman, Cornelia Parker and James Turrell. From a scientific perspective, the project is clearly aimed at furthering ways of achieving public engagement and refining research already begun using STEM expertise and the ARISE project, based largely at the Meteorological Department of the University of Reading. Although the article contains some minor grammatical typos throughout (no full-stop, end of 72; were/was, 113; capital To, 150; comma after 1st word, 182 etc....therefore needs full proof reading throughout) it is an interesting account of an innovative project and gives good information regarding its public presentation and outreach feedback."

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A full proof reading of the revised manuscript will be undertaken before resubmission.

"However, although the ongoing collaborative process is, in general, well documented, there is an implication within the article that the scientists are often problem-solving the artist's practical needs, with no in-depth interrogation and analysis by the team of the visual, audible and physical aesthetic of the objects and installations generated by the overall process and how this informs the scientists' own research and insights. It would be interesting, for instance, to have (280-344) much more detail about how the collaborative process altered each member of the team's initial ideas and approaches to his/her own subject. I believe that the article would also benefit from a more in-depth description of how and why these particular individuals from these specific disciplines began working collaboratively in the first place – what their original expectations were with regard to research - and how they intend to incorporate aspects of the public feedback they gathered to develop this extremely interesting project further. This could be more fully developed in Section 6, where common methodologies (347) would benefit from being described in much more depth, to reveal the successes, failures and critical analysis of each discipline's methodologies and how the combined methodologies systematically achieved the final outcomes and, potentially, a new methodology. The article explores an intriguing topic, but could give a more rigorous record of the positive and negative surprises generated when two disciplines come together."

We will rewrite this section with emphasis looking at other art-science collaborations such as those described in Leach (2005) and in Webster (2005) compare to the project described here. We will also compare how the approach of Tsoupiakova et al (2013) differed to ours. We will also draw similarities from Eldred (2016) who demonstrated how art collaboration can benefit problem solving especially for scientists. Whilst keeping this section concise and focused we will try and add more from the authors experiences to provide a fruitful account of the process for others to draw on.

"The art/science project itself seems to offer the public a potentially poetic experience and to be physically engaging. However, from the article, I do not quite understand

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the gallery context of the immersive audience participation. If I walked into the gallery, exactly what would lead me to sit on the chair and how would I understand the implications of the uncanny and mysterious source that I was listening to? Is it a feature of the work that there should always be information sheets or 'exhibit demonstrators' available for the public, or does the installation reveal its meaning in another more subtle way – more akin to, say, a Joseph Beuys installation? The article would therefore benefit from a passage describing the team's views regarding public engagement methodology – the pros and cons of installing an object which emanates a scientific principle through its construction and physical location without the principle needing to be contextualised by an additional means - as this does not appear to be fully documented or analysed.

Professor Charlie Hooker."

Hertz was firstly exhibited at the Oxford IF festival with an educational agenda as this was the context of the science festival and where the emphasis lay. Marlton and Robson were all present and each gave talks about their involvement, how the piece worked and their individual research after which people were invited to interact with the infrasound machines. The audience also had the opportunity to talk to all the collaborators present.

For the exhibitions at Tramway and We The Curious a more sensorial, experiential encounter that emphasised hertz's aesthetic and artistic aspects was pursued. Figure 7 of the paper shows an image of the hertz piece and how it was set up at the Tramway in Glasgow. In section 2 of the paper we described how the subwoofer was used to fill a space with the loud low frequency sounds that were also passed through the vibrating furniture. It was envisaged that sound from the subwoofer would entice people towards the exhibit. Due to a limited budget, talks by the co-authors at We The Curious and the Tramway could not be undertaken. Therefore at Tramway in consultation with the curator an interpretation board was used with a short introduction to the work and invigilators would be briefed and available to answer questions if asked. Unfortunately, since there was a lack of feedback from the public at the venue it is difficult to know

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how well this worked.

The approach for We The Curious was for the roving educational team to be briefed on hertz and for the project to be included in educational demonstrations of exhibits at We The Curious when they happened. We The Curious is a science venue with a dedicated space (The Box) for artworks and hertz was the venues first commissioned piece. More scientific information was included in the interpretation and postcards with relevant images and brief facts about infrasound were available. Invigilators were also briefed with information on the project to enable them to answer questions.

In a revised manuscript we will describe in more detail in section 3 how the piece was curated at each venue and include much of the above discussion there.

References Eldred, S. M. (2016). Art–science collaborations: Change of perspective. *Nature*, 537(7618), 125-126. – How working on a art project changes your perceptions of your own work

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Tsoupikova, D., Kostis, H. N., & Sandin, D. (2013). A practical guide to art/science collaborations. In *ACM SIGGRAPH 2013 Courses* (pp. 1-55).

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