

Museums, Technology and Social Interaction in “Anyone Can Innovate!”

Gabriella Di Feola¹[0000-0001-5802-2032], Erik Einebrant¹[0000-0002-4614-2691]
and Fredrik Trella²[0000-0003-4973-6425]

¹ RISE Prototyping Societies, Göteborg, Sweden

² RISE Prototyping Societies, Umeå, Sweden

Abstract. The purpose of this paper is to describe insights gained from a collaboration project between RISE, an experimental research institute, and Borås Museum, a local cultural heritage institution, around the topic of how technology can be used in museums to encourage social interaction between visitors and between visitors and the museum staff. This is investigated through a case study of “Anyone Can Innovate!”, a multi-participatory game-like VR-installation, using a perspective of participatory design. The study was conducted through observations by the developers, formal user testing with externally recruited testers, and by an interview with the responsible project leader and curator from Borås Museum. The VR-installation was tested in two iterations with different levels of embedded guidance, and included different roles for the participants, as an attempt to boost collaboration and interaction. One conclusion of the study is that the use of technology in a museum doesn’t per se mean that it will be participatory, and that it does not necessarily exclude the role of a human guide. In the discussion part, examples are given on how technology can be used as a tool to use participatory design.

Keywords: Museum, Participatory Design, VR.

1 Introduction

1.1 The Changing Role of the Museum in Society

Our expectations on public places and institutions are changing rapidly. According to John Falk and Lynn Dierking, most museums now have both food options and a shop in connection with its activities, which is then considered a part of the museum experience [1]. Also, children’s activities and even playrooms are offered to meet the expectations of the visitors. Another example is the transformation of the Swedish libraries from book lending and reading to a place for societal information, workshops and public debates. Libraries and museums are also facing competition from digital media and the Internet. According to Pier Luigi Sacco's [2] ideas, the audience's cultural consumer attitude has changed, for instance through recent technological advances. The development of society requires us to re-evaluate our public places and their functions. Also, the new discussions about re-evaluating ICOM's museum defi-

dition make this most relevant to consider. For whom and for what needs do we design museums?

1.2 Purpose, Method and Theory

The purpose of this paper is to describe insights gained from a collaboration between an experimental research institute and a local cultural heritage institution. The main research question approached in this paper is:

- What are some implications of designing and implementing a multi-user VR experiences to encourage social interaction between visitors, and between visitors and the museum staff at Borås Museum?

The paper approaches the area through a case study of the project “Anyone can Innovate!” through the lens of participatory design as a way to include the perspective and boost the agency of the visitors in a museum installation. Participatory design engages the concerned users, and allows them to have influence in the design. Nina Simons argues that the museum can be seen as a platform enabling different groups to connect and allowing their different experiences to take up space in the museum [3]. She defines participatory design as something that creates an experience that allows for visitors to “[...]create, share and connect with each other around content [...]” [3].

The case study was performed through observations of internal testing, anonymised testing of the two iterations of the developed prototype and interviews with a group of testers recruited by an external part.¹ All observed subjects were anonymous during the test and there is no recorded personal data connected with either the testing or the observations. In order to gain a relevant perspective from the museum, an interview was performed with Frida Andersson: Curator, Pedagogue and Project Manager at Borås Museum, with a background in Digital humanity. She was also a tester and performed testing of the installation when it was in use at the museum.

1.3 Limitations

The contents of this paper have been based on one sole case study of the project “Anyone can Innovate” and cannot, for that reason, be said to be universally applicable for every unique case. The formalized user testing performed in conjunction with the project was done on a limited scale, with only two formal test rounds with a total of 6 subjects. Also, the museum’s perspectives are based on comments from one person; Andersson sometimes describes more general observations like opinions of other members of staff and visitors, but these are her own personal reflections. The project as a whole was a pilot/demonstration project and for that reason it was a first attempt to investigate how to use technology as a way to incorporate participatory design in a

¹ The testers were recruited by Utopia, an association focused on accessibility issues throughout society.

museum. With all this said, this paper can provide indications on the topic and is to be considered as an enabler for future research.

2 Background

2.1 The Collaboration Between Borås Museum and RISE²

Borås Museum, an open-air museum in the town of Borås in Sweden, realised the opportunities with using modern, digital technologies and started questioning their traditional ways of thinking and re-think what a museum is, and could be. According to our interpretation of Sacco's ideas, visitors in general have traditionally had a passive role at museums; they have been observers of what museums exhibits [2]. The visitor has not previously had the opportunity to interact with objects himself. The exhibitions at Borås Museum are not primarily designed to engage the public in interaction and active participation, part from the pedagogical activities arranged in the open air park during the summer and some events organized by other parties and associations. In fact, most of the museum's pedagogical activities take part in the open air setting; guided tours is the only bookable activity for schools and the social interaction between the museum pedagogue and the visitors hence consists of a provider of contents and a clear recipient.³ The museum wanted to enrich the visitor experience and spark more engagement in the museum's exhibitions, as well as encouraging social interaction between the visitors themselves, and was therefore curious to see whether they could achieve this through the use of technology. Please note that this wish was approached not only through the lens of participatory design, but also by using game design.⁴

3 A Case Study: "Anyone Can Innovate!"

3.1 General Description of the Experience

The resulting Virtual Reality or VR-installation (Anyone Can Innovate!) aimed to encourage social interactions between the museum staff, the visitor and cultural heritage. The main purpose of the installation was to teach and inform the visitors about innovation history and the iterative, exploratory and often multidisciplinary process

² A similar background is discussed in Di Feola, G., Einebrant, E., Trella, F.: Immersive exhibitions and game design as a tool for storytelling in museums: Development of the virtual reality experience "Anyone can innovate!". Zip-Scene conference. Upcoming paper (2021).

³ Frida Andersson, Curator, Pedagogue and Project Manager at Borås Museum, interview on the 10th of January 2020.

⁴ This is further discussed in Di Feola, G., Einebrant, E., Trella, F.: Immersive exhibitions and game design as a tool for storytelling in museums: Development of the virtual reality experience "Anyone can innovate!". Zip-Scene conference. Upcoming paper (2021).

that is connected with innovation, and also to debunk the notion that innovation is exclusive for the selected few of the elite. The experience hopes to spark curiosity and encourage the problem solvers of tomorrow. Also, the experience tries to convey that to solve the challenges of today, a multidisciplinary approach is vital in order to be able to be truly innovative. The experience contains one level and is set in a prehistoric era where the participants face the challenge of creating a fire.

The experience was tested in two different iterations. In the first iteration, participants were provided with a limited amount of clues and instructions in written and audible form. The second iteration was developed after initial testing and contained more elaborate written instructions combined with audible instructions that were played at the same time as the written message was displayed.

3.2 Multi-Participatory Interaction Through Different Roles

In the installation, VR-technology was used for the sake of its immersive qualities in terms of mediation and interaction between the participants and content, but it was also used for the sake of effectively immersing the participants in a role-play setting that would encourage social interaction between them. This by creating a challenge-driven narrative designed in such a way that it would encourage conversations and collaboration between the three participants, for them to solve the embedded challenges together.

The reason for this was to highlight the need for the multidisciplinary collaboration when it comes to innovative work. This is supported by the fact that the three participants have different roles in regard to the challenges, and different abilities and clues are associated with these roles. In the case of “Anyone Can Innovate!”, some of the challenges can only be solved as participants combine their different abilities. Each of the roles have two full body avatar models, one male and one female. The different roles were the following:

The Shaman. This is the spiritual leader of the group, and also has the ability to interpret signs and guide the group in times of uncertainties. The Shaman can see things others do not, and need to guide them. The Shaman gets clues about things that are going to happen and has a clairvoyant ability which enhances the leader and guide roll in the group dynamics. One example of when the Shaman needs to use his/her abilities to help the group is when the group enters a cave to take cover from the rain. Inside the cave there is a cave painting that gives clues to how fire can be made, and this painting is only visible to the Shaman.

The Gatherer. The Gatherer is the expert when it comes to finding things to use when making tools. The participant having the role of the Gatherer would for example get a written and spoken clue saying that he/she should build something sharp (required for chopping down the bush covering the entrance to the cave) and give this to the hunter.

The Hunter. The Hunter is the strongest of the group, and the expert in using tools. The Hunter would get a written and spoken message saying that he/she should use something sharp in order to clear the entrance to the cave, and that the Gatherer is good with building tools.

When moving in the physical world, the participants also move in the virtual world. The movement of participants is synchronized in physical and virtual space. As a result, it is possible to do for example a “high five” in both physical and virtual space simultaneously. This was achieved by challenging the existing standards that exist within the implementation of multiplayer in VR, like for example the Hologate system.⁵ The one level that was in the prototype contained three different virtual rooms, or “scenes” as they are referred to in this context. When moving between the scenes the participants would enter the new scene in the location corresponding to their physical position in the room, so that there would be a continuity in the movement. This type of implementation with all three participants in the same physical and virtual space means that the participants are collaborating as being in the same room with their physical movements and using the two hand controllers to pick up objects in the same virtual room, and they all see both themselves, but more importantly the other participants as their virtual avatars moving around and interacting with their surroundings.

The Game Leader. In “Anyone can Innovate” the participants has contact with the physical space through a designated leader of the experience. This person guides the participants, helps them solve the challenges and encourages them to talk to each other. The guide is not inside the VR-experience, but is watching the participants pov-perspectives on three different screens. So, the technology does not exclude the use of a human guide and an activity leader, it merely changes the setting of the museum space. The developed VR installation is not self sustained, but requires active engagement of an activity leader to make it work, and the required engagement of the game leader was different between the two iterations of the prototype. In the first iteration the game leader had a more prominent role in guiding the participants through the narrative, since this version did not have as many scripted, embedded instructions to the participants. In the second iteration there were more scripted, embedded instructions to the participants, something which changed the role of the guide.

3.3 Results from Observations and Testing

Our observation is that when participants were seeing each other in the form of digital avatars moving around in the prehistoric setting, it encouraged them to interact. In several cases the participants talked to each other by commenting on the looks of the

⁵ For more info on the Hologate system: <https://hologate.com/products/>, last accessed 2021/25/02.

avatars and the in-game movements made by the avatars. The participants were observed poking each other with virtual objects or trying to pick up virtual artefacts and hand them over to each other. Since this happens in real time, in both the physical and virtual space simultaneously, the participants can communicate with each other by simply speaking to their fellow group members, ask questions or give instructions. In other words, this mimics a social interaction that we are very familiar with, and thus comes very natural to almost all participants.

There are in-game sounds which are played to the participants using the built-in headphones of the VR-headsets, but these sounds are not completely shielding and kept at a rather low volume, meaning that it was possible for the participants to speak to each other without the use of any technical aids. However, there were notable differences between the two iterations of the prototype due to the number of sound messages. According to Andersson⁶, increased interaction between the players themselves as well as with the game leader were observed in the first iteration. Andersson⁷ believe the reason is that the first version contained less stimuli in the form of audio and text resources, and that as a result of this, the players were observed as more autonomous.

The first iteration allowed for discussions between the participants. They asked questions to one another like: “do you know what we are supposed to do here?” and “are you also able to see this thing?”. Also, they initiated contact with the guide to a greater extent.⁸

In the second iteration, a text frame containing a written clue was implemented. The frame had a black background with a white text on top. The frame’s placement was blocking part of the participants’ view, as a try to clearly convey the clue contained in the message, and make sure that the participant would not miss it and have an adequate amount of time to read it. Our idea was to help the participants to focus on the task at hand, and as a way to meet needs in accessibility and offer instruction in both writing and sound. This was also something that was requested by some of the testers from the formal testing, that the clues should be offered in different ways of communication using multimodal sources. According to Andersson⁹, the text element seemed to obstruct the view of the participants and thus impeding them in their interaction with each other.

As game leaders, me and my colleague experienced that it was harder to get the players to focus on the task at hand in the second iteration. Both of us believed it was because of the overload of information in forms of the text box-

⁶ Frida Andersson, Curator, Pedagogue and Project Manager at Borås Museum, interview on the 10th of January 2020.

⁷ Ibid.

⁸ Ibid.

⁹ Ibid.

es and the audible tips constantly popping up and blocking the players' sight.¹⁰

Regarding social interaction and collaboration, Andersson¹¹ registered some differences between the two versions, that she believes is linked to the amount of stimuli in forms of text boxes and clues that consisted of audible voice recordings, because they notably made the interaction between the guide and the players more difficult. The second iteration thus created more individualism in the experience.

It seemed as if the players were unable to interact when the text box shielded their view. The players playing the Hunter and the Gatherer would often pick up things while waiting for the view to come back. The Shaman couldn't do much.¹²

The installation was designed after the idea that active participation would have to contribute to the collaboration and where the roles previously mentioned would help to generate a group dynamic. Our testers said that they appreciated the opportunity to collaborate and some of them also wished for even more collaboration. Furthermore, the testers talked about that they wanted the roles to be more explicit, which is something that was taken into consideration in the second iteration. The testers also expressed a wish for including a more passive role for those who didn't want to or couldn't move around as much as the active roles required. Andersson¹³ also heard this wish being expressed from one senior visitor who was pleased with just being immersed in the virtual space.

Andersson¹⁴ claims that it was sometimes difficult to get the participants focused on the task, to not collide with each other and with physical objects (despite the fact that there were visual aids embedded into the experience that would alert the participants to when they would exit the designated play area), and that this was even more complicated in the second iteration when the participants were exposed to more information in the experience.

4 Discussion, Conclusion and Future Possibilities

Through this collaboration, the museum got access to developers of new interactive presentational technologies. This opened up a new possibility to pursue a participatory approach and enhance the social exchange between the participants and the museum. Maybe there is an expectation that technology in itself is social, interactive and participatory, like e.g. games or social media. But to introduce technology in the mu-

¹⁰ Frida Andersson, Curator, Pedagogue and Project Manager at Borås Museum, interview on the 10th of January 2020.

¹¹ Ibid.

¹² Ibid.

¹³ Ibid.

¹⁴ Ibid.

seum doesn't mean that it will automatically generate a social and interactive experience/installation. When working with participatory design, technology could be seen as one of the possible tools for the museum to use. One example is the Swedish National Museum of Science and Technology, that has been working with exhibitions on the topic of games. The research done by Lina Eklund, Björn Sjöblom and Patrick Prax indicates that multi-participatory games generated a higher level of interaction between the staff and the visitors, as compared with single-participatory games [4].

Our conclusion based on our case study is that the most successful levels of social interaction, as based on the perceived quality and quantity of the conversations between the participants themselves, and between the participants and the game leader seemed to have been achieved when the game leader had more agency in guiding the participants and helping them through the experience. This could be both due to the fact that at the time of testing the technological readiness of the installation was at a rather crude level, and that the written and spoken messages incorporated in the experience could have been improved. But it could also be that it is very hard to design a digital system that can match the performance of a human guide when it comes to encouraging social interaction between multiple participants acting and interacting in the same physical space, in real time and in a dynamic way. This suggests that the conclusion of this study is that the technology can be an enabler for creating increased social interaction in museums, but that it is never as powerful as when put in the hands of an enthusiastic person. When the installation works flawlessly it was easy for the participants to get immersed in the game and the task, but when there were problems with the installations the participants sometimes at least got a good laugh or something to communicate about. When these technical difficulties occurred, the game leader was crucial for guiding the participants through the technical difficulties and refocus at the participants on the games task.

Also, through actively participating together in the immersive VR-installation, the participants co-create their experience, and this experience will be unique for each set of participants and each occasion. Participants temporarily own a place over which they have agency in a museum, where they can decide if they want to follow the narrative or just explore freely. The experience also creates a social relationship between those who play together in groups. Participants must communicate within the group to understand and to solve the task. The participants will be able to create a common engagement through what Simon calls a “me-to-we” design, which occurs when the participants need to socially interact with each other [5].

Another motivation for participatory design and the multi-participatory approach to the VR-installation was so that it could answer to the fact that most museum exhibitions are required to work for groups of people and not just individuals. Notably, museums are often the hosts of school visits, something which implies groups of varying size and age spans. In this respect, the three-participant installation did not fully meet the demands, since the time required to complete the experience is upwards to 30 minutes. The problem is perhaps the combination of the fact that one headset can only be used by one person at a time to participate and the long time required for a session in the installation. With this said, there could be ways of making a VR-installation more suitable for a museum, and also to use the technology to encourage interaction

between participants in the installation and onlookers waiting to get access. In this case it could have been done by e.g. having screens displaying what goes on inside the experience to the onlookers, and giving them access to certain information or a certain perspective not accessible to the participants inside the experience. By then using some kind of communication between the onlookers and the participants, these could then be guided and aided (or even for that matter mislead and confused, either deliberately or by mistake) by the inputs from the onlookers. One example of where this is used is the game “Keep Talking and Nobody Explodes”, where one person is inside VR and set with the task of disarming a bomb, but does not have the relevant information required to do this. Instead, this information is presented to the participants outside of the experience, and they have to guide the person inside the experience how the task should be performed. If this concept was combined with the multi-participatory and challenge driven museum concept, it could be a most interesting way forward and a way to avoid the boredom of waiting for a turn in the experience, and at the same time enhancing the experience for those inside the installation.

When testing the installation a few comments arose from participants that some of them wished for the inclusion of a more passive and only observing role in the installation. It could be that active participation is not something that is suitable for all, and that in designing these experiences it is wise from a perspective of accessibility and inclusion to also offer the option that suits a more passive visitor that is not comfortable with active participation.

One outcome of the project is that Andersson¹⁵ thinks that the collaboration has contributed to a more open attitude towards technology within the culture department of Borås Municipality, and after the project she started working with citizens’ dialogue, in which technology was used as a tool for participatory design-based workshops for children and young adults in urban planning [6].

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¹⁵ Frida Andersson, Curator, Pedagogue and Project Manager at Borås Museum, interview on the 10th of January 2020.