Interactive digital storytelling and tangibility in cultural heritage museums

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Abstract

This paper focuses on how a single installation can enhance personalization of the information in cultural heritage museums and enhance the overall experience using interactive digital storytelling and the ability to touch artefacts. Interaction design methods helped establish best practices centring on usability. In the process low-fidelity and mid-fidelity prototypes were created based on the field studies such as observations in exhibits and interviewing professionals in different museums. The conclusion could be made that artefact and the purpose of the exhibit as an whole does get more intense if one has the opportunity to touch and make it part of the visitors journey can be said.

Keywords

Interaction design, museum, cultural heritage, digital interactive storytelling, tangibility
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1. Introduction

Museums are often thought of as old, dusty places with artefacts in glass cases. There is a need for them to reconnect with their intended visitors by getting them to participate. Thanks to new technology in their lives people have become more active in various fields. Unfortunately finding their way into museums is not one of those (Simon, 2010). Therefore the assumption can be made that new technology can make people more active in museums as well. New technology makes even more demands of museums but also offers new possibilities for them to reach that goal. People going to museums today expect to find different cultural outlooks and access to a great variety of information (Simon, 2010). A google search away is all information needed so why visit a museum. What museums can offer is relevant information and guidance in a feel that makes it much more an experience than just reading a source of information.
2. Background

2.1. Research area
“What cultural role and significance can physical artefacts assume in the age of information technologies?” (Giaccardi, 2006, p.1).

There has been an evolution in the museum field thanks to new wireless techniques though even more traditional technologies, such as exhibition kiosks, mobile guides and virtual collection websites are changing the museum experience (Ardissono, Kuflik and Petreli, 2012). Traditionally an experience and the storyline for a visit to the museum have already been created for the visitor (Not and Petrelli, 2013) but now museums have come to acknowledge that there is a need for a diverse narrative (Giaccardi, 2006). Interactive media has come to blur the line between author and audience (Cameron et al., 2004). Mobiles and tablets that always are connected to the internet can also be linked to the objects on exhibit providing the potential to change the user interaction in museums (Hudson-Smith et al., 2012 arvar) in a similar manner to how ubiquitous computing creates new ways for interactivity. There are more and more museums inviting their audiences to actively participate rather than passively observe, raising visitor expectations of more than just reading long texts and look at documents (Behringer, Engbring-Romang and Göbel, 2004). New artefacts can even be created that include technology but are still tangible and not simply an info-kiosk standing in the corner of an exhibition. (Hall and Bannon, 2006).

2.2. Purpose
The question why use interaction design in producing exhibitions and installations is an interesting one. The advantage of creating easily understandable, tangible and memorable installations created with the help of tools that are offered by interaction design cannot be denied (Keshavarz, Dehghanpour and Ranjbarian, 2009). Especially as soon as technology is brought into the museum. The field is relevant yet a seldom studied in human computer interaction. The findings of studies in this field are of value on how interactive installations in a different ways can engage visitors and establish a personal connection to the cultural heritage that can be found in museums (Ciolfi and McLoughlin, 2012). Including technology and interactivity might sound simple but due
to it being more or less a novelty it needs detailed research of visitor expectations and experiences while still keeping the curator’s wishes in mind (Ciolfi, Bannon and Fernström, 2001). Evolving and changing technologies opens new windows and opportunities to personalize cultural heritage exhibitions (Ardissono, Kuflik and Petrelli, 2012).

If correctly used, personalization can enable ever-changing museum mass communications patterns into more user-centred interactive ways of conveying information (Rutledge, Aroyo and Stash, 2006).

Current exhibitions are going to be connected to newly developed information services (Ciolfi and Bannon, 2002). As in interaction design and architecture, museums will be filled with users or, in case of the museum, an audience. But now these people will fill the museum with their own thoughts, ideas and understandings thanks to new technology.

2.3. Research Question

“How can a tangible installation with the help of interactive digital storytelling be implemented as an involving artefact and personalized approach within its purpose in a cultural heritage exhibit?”

The idea was to find if a tangible installation using interactive digital storytelling can add to the value of an exhibit while still containing the values and in the purpose of the exhibit. Interactive digital storytelling further encourages a personal approach to stories and artefacts while tangibility make it more real.

2.4. Ethics

One of the methods used in this research which will be explained more thoroughly later on in the paper is interviews. It is important to get consent by the people interviewed to ask for permission to use the information gathered from them in the research. The content and purpose of the study is to be explained to people involved so that they know what they agree too (Saffer, 2010). Another issues is to respect the privacy of those involved. Another method, also to be taken up later in the paper is observations. Pictures or video tapes taken during those are not to be used or publish without the people in its consent (Saffer, 2010).
2.5. Limitations
Different kind of exhibitions attracts different visitors (Hornecker and Stifter, 2006). Museums can be quite different. There are art, technic and many more museums that only centre on certain themes and fields. Narrowing down and explaining a specific type of museum makes the process easier and more understandable. Therefore the research mostly focuses on cultural heritage museums. Specifically the exhibition “På Gränsen” at “Dunkers Kulturhus” in Helsingborg, Sweden. Due to its proximity it was easy to visit and try different sorts of methods at different times. Furthermore the hospitality of the people working at Dunkers Kulturhus simplified the research. Centring the process on one exhibition helps keeping the researchers focused and keeps it confined instead of taking pieces from here and there. Testing prototypes were restricted due to not being able to test in the planned environment of the concept.
3. Theory

3.1. Definition Museum

While there are immediate connotations of the word “museum” that spring to mind it is somewhat more difficult to precisely define the term. Science is not poetry. Museums themselves have a hard time agreeing what their purpose and meaning is (Alexander and Alexander, 2007). The word museum coming from Latin or in ancient Greek mouseion has been used differently through the ages. From the beginning it was thought to be a temple dedicated to goddesses called muses. Famous for being inspiring in different arts (Alexander and Alexander, 2007). Fact is that museums have existed in one form or another in the Western world since antiquity. There are conflicts between different parties as to what their main purpose. It can be argued it is to preserve objects while others may say it is to educate the public. Collections choose to be private or public and focus on things varying from cultural heritage to science. The definition used in this text is that a museum is a non-profit organisation that has a space, be it a physical or virtual, and which collects and stores tangible or intangible objects for the public to see, react to and interact with (Alexander and Alexander, 2007).

3.1.1. Purpose of a Cultural Heritage Museum

Preserving cultural heritage, tangible and intangible, is important as it at helps us identify who we are and where we came from (UNESCO, 2003). Safeguarding cultural heritage and showing its diversity can be useful in a time where new ways of communication get us closer to people all over the world, at the same time as intolerance towards them is growing (UNESCO, 2003). If the museum is seen as a place for learning culture, heritage becomes inevitable as it has helped form the culture we see today. It helps us understand our own place, cultural background and history and hopefully forms a better understanding of the complexity of this world and its international relations. It has been maintained that every human being has a right to cultural education. Therefore a place is needed where it can be accessed (UNESCO, 1997). Heritage can be understood as what we leave behind and what already has been left but it’s also a patchwork by which we define ourselves (Wallace, 2013). Culture,
another word not easily defined, basically is defined as beliefs, customs and art of a society that is learned by passing knowledge (Merriam-webster.com, 2014). Gradually our access and experience of cultural heritage museums are changing as well, partly thanks to newly developed digital technologies. People can be more participatory in their visit as the museums become more audience-centred than they have been before (Simon, 2010.).

### 3.2. Interactive Digital Storytelling

To explain the definition of interactive storytelling story and storytelling must be separates from each other. A Story is definite and static. It is not a living organism but an unchangeable whole. Storytelling on the other hand is a process, living and breathing. A static such as a story cannot be interacted with as it does not “do” anything. Interacting with storytelling comes easily as the story is still in the making. To grasp the idea of interactive storytelling abstract thinking is in order and term one knows as a ”plot” has to be let go of. Instead of plot, there is as mesh of possibilities that all consist of the same “truth” (Crawford, 2013). While stories jump from scene to scene in a strict line, in the end reaching a conclusion. Interactive storytelling is rather a spider web where different lines can be woven in all directions (Crawford, 2013).

Adding technology to the storytelling creates even more possibilities. Computers and technology have helped traditional media improve but to use it to its full potential and create something new instead of using it as means to reach a goal and combine it with interactive storytelling (Crawford, 2013). The field of interactive digital storytelling is quite young. It had a slow start around the eighties while some experiments were conducted into the next decade (Crawford, 2013). More and more the interest in interactive digital storytelling started to grow and in the early nineties two recurring conferences were separately started, centring on interactive digital storytelling. In 2008 these two fused and the ICIDS: the International Conference on Interactive Digital Storytelling was created (icids.org, n.d.). Interactive digital storytelling is growing, not exclusively but partly because of new techniques such as Internet of Things, where physical objects are connected to the internet. Innovative and fresh ideas are also coming into the making in films. An example is the documentary Bear71, shown at the Sundance Film Festival 2012, where the audience could become part of an interactive
forest by using their smart phones (Weiler, 2012). Interactive digital storytelling is a very open medium and can be implemented and adapted in different ways. This makes it ideal for use in cultural heritage museums that are as well quite diverse. Interactive digital storytelling creates possibilities for a more personalized approach to artefacts and stories inside an exhibition.

3.2.1. Tangible digital interactive storytelling
One of the possibilities with new media in interactive digital storytelling is getting back to telling tales similar to how they have been told around campfires. As the listener is physically present in the time of the story being told she can influence how the story is told or perceived by her. The audience can talk to the storyteller or maybe subconsciously set themselves in a situation where they feel the story in a different way. For example a person listening can sit closer to the trees while a scary story is told which could influence the person to feel more scared due to the nearness of the darkness and the unknown.

Ubiquitous computing poses an opportunity for interactive storytelling. By connecting with tangibles instead of just a visual interface the audience reacts stronger emotionally to the story. To use tangible objects as a help to tell stories is nothing new. People in theatre or parents telling bedtime stories, for example, have used props for a long time as an aid to their storytelling. (Mazalek, Davenport and Ishii, 2002). New ways of learning can be developed through innovative artefacts and environments created by mixing the digital and physical (Hall and Bannon, 2006). By making the interface of the interactive storytelling touchable and with the help of multimodality, meaning using natural input and different multimedia output technologies (Oviatt, 1999), other senses can be activated. Input technologies could be speech, gaze or pen and be projected as audio, video or movement (Oviatt, 1999) To find out how these tangibles change the way interactive storytelling is being experienced the line between the real and the virtual must be blurred. The interface of the virtual might expand into physical reality (Paiva, 2005). Multimodality is important as it helps to experience and learn (Hall and Bannon, 2006) and features of digital storytelling can be enhanced (Cho et al., 2009).

People, while visiting museums, tend to remember most of what they did compared to what they heard, saw or read (Keshavarz, Dehghanpour and Ranjbarian, 2009). To
create a more entertaining story the possibility of using multiple characters’ viewpoints is needed to turn it into a more intense story. This is often used in film productions and books to add more depth to the development of a movie (Mazalek, Davenport and Ishii, 2002). The artefact should basically involve the observer, or user, in a natural conversation with the way you present it. The tangible and physical environment connects with the visual presentation (Behringer, Engbring-Romang and Göbel, 2004). The feeling of the communication between the artefact or story and the visitor becomes more natural as new technologies create opportunities to create installations that are more physical, social and intuitive. These new installations are because of this more appropriate in exhibit development than the predecessors that relied on mouse and keyboard interaction (Spadaccini, 2014).

3.3. Interactive digital storytelling in culture heritage museums

Designing interactive installations in museums exhibits has come so far for there to be some practices that do not work. As an example installations cannot be designed with multiple choices where the options are equally noticeable as it would confuse the users on what to concentrate on. It is difficult to the design with a possibility to interfere with other users. While acting simultaneous the others actions can be felt to be disturbing when performed at the same time. Interactivity where the spectacle can be interrupted at its climax by the user and can’t be shown to its full extent. The visitor ought not to misinterpret the main focus of the installation or exhibition. This could lead to irritation for the visitor as they tend not to have the background knowledge to gather the right information. Additional help to guide them is needed (Allen and Gutwill, 2004). Allen and Gutwill (2004) also suggest in their text that less important features cannot disrupt the primary feature. Features that exist solely based on interactivity confuses the visitor as they expect a connection to the displayed artefact or told story. A new step into the modern world for museums is the museums presence on the web, thereby creating virtual museums. Sometimes, to complete exhibitions, they have to be at the actual place of the museum. In other cases there have been some collections of cultural heritage that solely exist on the web. An exhibition that not solely has presence on the internet is the MUVI project by the Italian publishing house
Sonar/TiConUno which has the objective of preserving some of the cultural heritage of Lombardi (Giaccardi, 2006). The residents of Lombardi can send in their own piece of history, which when selected will be presented on their online database. To create more awareness of the project a radio show on the local radio was started on which they told some of the stories. By being present on two different types of media more interest for the project was generated. Older generations might not always know how to use the computer and wouldn’t have found the MUVI project without the radio. People seldom realize that their own stories or valuables might contribute to their cultural heritage. In this project the audience itself became the creator of the museum (Giaccardi, 2006). This kind of collaborative or individual storytelling in museums has become a challenge. Just the awareness of people around the visitor or user change the experience (Grinter et al., 2002). If the physical visit to a museum takes in a small group that needs to be taken in consideration. The quality of the interaction between the visitors in the small group improves the visit increasingly (Callaway et al., 2012) Interactions, conversations or discussions between the small groups do not necessarily have to take place during the actual visit inside the museum. The exhibition might just influence conversations immediately after the visit which adds to the experience (Callaway et al., 2012).

Museums in the future will change even more considering, not only the constantly changing technologies, but also how in some few decades even the older generations will have grown up using computers. The importance of the artefact should not get lost in the technology, which can make guides where smartphones and tablets are mostly used, hard to design to not take the focus from the content and artefacts. An interesting aspect is that even though the technique must not overshadow the artefact or story, it does not necessarily mean it should be invisible. It can spark an interest in technology and the background of the exhibition and how everything comes together (Hall and Bannon, 2006). Others argue that to let content and experience be the main focus for the visitor the technology needs to be undetectable (Wyman et al., 2011). For example audio guides and touch screen terminals can be felt as too limiting for living exhibitions. Instead the artefacts themselves can become the interface for people to access digital content (Ciolfi and Bannon, 2002). Multi-sensor digital media can as well enhance the digital storytelling when working with tangible installations (Cho et al.,
The interaction and technology should be simple (Hall and Bannon, 2006). Quality is important not quantity. It is better to only have a little technology in an exhibition but it needs to works very well. In designing an installation for an exhibition if technology is really required needs to be considered. Just because technology can be implemented doesn’t mean it has to be done. Easy interaction, where the user gets to the information in fewer steps makes visitors feel more content (Wyman et al., 2011). Not only is today's technology a way to show data and making it accessible, it can also act as an stimuli to research for oneself (Giaccardi, 2006). Make people research and explore them and come to their own conclusions (Hall and Bannon, 2006). Before the internet we were used to obtain our knowledge in a harder way. The search for information was part of the learning and understanding. How people correlate to information has changed immensely thanks to how many sources we suddenly have easy access to (Wyman et al., 2011). Mostly when people can explore for themselves this means they get to get hands-on knowledge. The difficulty in this is that there is a public opinion that artefacts in museums are not to be touched and it is not always obvious that they are allowed to so (Ciolfi and Bannon, 2002). Placing interactive digital installations next to more traditional could help getting people to interact and understand better than through having them in different corners of the exhibition. As generations have diverse interests in an exhibition this gets them to experience something they normally wouldn’t. If the possibility exists interactive hands-on exhibits awakens interest in nearly all types of visitors (Hornecker and Stifter, 2006).

While telling a story the environment it's being performed in needs to be considered (Mazalek, Davenport and Ishii, 2002). The architecture and the spatial design of an exhibition is a big part in how we experience their storytelling. The diversity of museums space makes each experience unique and different (Wyman et al., 2011). Therefore to understand the space surrounding an installation or the whole museum is essential for it to work. Where objects are placed inside an exhibition and how they relate to other objects and installations influences the visitors’ behaviour and visit (Ciolfi, Bannon and Fernström, 2001). More touristic museums should keep in consideration that in most cases tourists only visit the site once (Ardissono, Kuflik and
Petrelli, 2012).

New technology does add to new experiences and interactivity in museums but it also helps preserve artefacts in different ways and makes them more accessible. So the focus is not only on the visitors but the on the artefacts as well (Leber, 2012).

In all this technology and interactivity, museums must not get too lost in their own goals and visions for the exhibition (Wyman et al., 2011)(Kuflik et al., 2011). People look for relevant information, to learn something and also for the experience in itself. And all this in the short time they visit a museum. Personalization plays a big part in delivering these expectations (Kuflik et al., 2011).

3.4. Conclusions on theory
One of the most important findings in interactive exhibitions and installations is that the digital cannot overtake the artefact or intended message for the visitor. To even further improve the experience by using an interactive hands-on ways to tell a story is to place it next to more traditional object exhibits (Hornecker and Stifter, 2006).

Barbara J Soren (2009) researched which kind of exhibitions changed visitors. When museums were being described as transforming these were connected to hands on installations, the right atmosphere and personalisation. The identity of the museum and how this influences who visits the museums is a key factor to the designing interactive digital installations (Ciolfi and McLoughlin, 2012). Tangibility and artefacts or story that can be personalized add to the experience and learning and is therefore a recommended tool. Technologies like a kiosk can stand between the visitor and the artefact and create a distance. This can explain why some technologies aren’t used that often. To avoid this interactive media installations have to be designed to fit with the surrounding space and in connection with artefacts. The feeling of how close the artefacts in the room are shouldn’t be disturbed by technology but enhanced (Ciolfi and Bannon, 2002).
4. Method

The methods were chosen based on the theory and are made to suit the conclusions to get the best results possible (Johansson and Arvola, 2007) in regard to the limitations of this research. Digital artefacts are mostly seen part of natural sciences and mathematical. In designing digital artefacts are approached in a more practical way by mixing with different sciences (Ehn, 1989). Most of the methods used are qualitative rather than quantitative. The qualitative research does not involve a lot of data but smaller samples and tends to be more subjective and can rather be interpreted than quantitative research which is mostly collected to statistics (Saffer, 2010).

4.1. Literature Research
The literature research focuses mostly on printed media and additionally the information on the internet. To understand the context of the design that is about to be done the background of the specific field in interaction design that is to be entered needs to be known. Already evaluated practices described in literature help the design with a jump start in creating even more adapted concepts. Another important aspect is to find out what has been done as not to repeat and make the research superfluous.

4.2. Observations
Observations are done to help the designer get a deeper knowledge of the field. A lot of issues and how people act can be found just by observing especially early in the process users’ needs can be grasped (Preece, Rogers and Sharp, 2002). Observing is essential to understand how an exhibition influences and force visitors to act (Ciolfi, Bannon and Fernström, 2001). In this case it helps to discover which technologies are used in museums and how users interact with them in the natural environment. For visitors it can be difficult to explain how they acted and what pattern they followed later on (Preece, Rogers and Sharp, 2002). Observations can, however, become time consuming and costly (Yoshimura et al., 2012) but regarding this research being qualitative it is not of an issue but still needs to be considered. To see how installations in exhibitions are used in a natural setting, observing without interfering is the right choice, but in some cases an input is helpful to see what is keeping them from using something (Preece, Rogers and Sharp, 2002). Different days and times need to be
observed as it attracts different sort of visitors and masses who might act differently in these settings. Taking field notes and pictures during the observation helps keeping track of what is happened when analysing behaviours after the visit (Hornecker and Stifter, 2006). Not only can observations be done to get now problems and current situations it also helps to evaluate prototypes and concepts in a later stage. The prototypes can be evaluated by observing the users using it (Preece, Rogers and Sharp, 2002).

4.3. Interviews
Interviews can be used in most fields as nearly every one of them has experts that are particularly knowledgeable in their field (Ejvegård, 2009). To get more insight in how museums work and what were important themes in designing exhibitions, interviews with people working in the field were essential. These were mostly performed in an e-mail conversation and some in person. Most people have different experiences of exhibitions so in order to access the diversity of these answers the questions were semi-structured. The questions were prepared beforehand and modified to suit different persona but the answers were open-ended (Preece, Rogers and Sharp, 2002).

It is important to formulate the questions as to get the most relevant answers to the project and research question. Also the questions should feel natural and not unduly influence the participants’ answers (Ejvegård, 2009).

To get an insight into the work of museums, professionals were very helpful. Museums usually have a purpose and not only are to please the momentary majority of visitors as a public service. Because of that they are also quite limited in their choices and have to know what can be used and what not. Interviews helped find existing issues and cases.

Interviews are also important after a person has tried a prototype to further see what people thought of it aside of observations. In this case the interviews were unstructured and open-ended. To be able to follow up on the observations made beforehand this felt useful. To not get lost in what the main purpose of the test is some points that need to be covered (Preece, Rogers and Sharp, 2002).

4.4. Scenario
Scenarios are basically stories set in a sequence of actions and event of one or more users that ends in some form of result. Different phases can be put in a scenario.
Existing problems can be demonstrated, use it to design and come up with ideas or to evaluate and explain (Rosson and Carroll 2009). Explanatory programming environments can help understand the situations that can transpire in a concept or idea (Ehn, 1989). Scenarios per se do not focus on the aesthetics and functionality but in the story of an object or concept together with a user (Johansson and Arvola, 2007). Scenarios help visualizing possible assemblies of different exhibition components (Ciolfi and Bannon, 2002). The positive side of using scenarios is that the possibilities of a concept can swiftly be shown to the designer and other people involved. These in turn can easily express their concern at an early stage. As they are quite easy to write and require little more but a pen and paper the design progresses fast. It is important though to keep in mind that these scenarios even when based on earlier studies and observations are a product of imagination and need to be viewed somewhat sceptically (Rosson and Carroll, 2009).

4.4.1. Storyboarding
To take the scenario further they can be illustrated and drawn as storyboards. The story or narrative is shown visually instead of written. Storyboarding is a usual technique in Human Computer Interaction design (Truong, Hayes and Abowd, 2006). Storyboard scenarios are not easy in a way that the user’s motivation and emotion in a situation have to be captured (Rubin and Chisnell, 2008). It is a kind of brainstorming so the mind needs to be open and creative. Details are unnecessary, the holistic image or story is the fundamental part. Instead the message and concept should easily come across.

4.5. Prototyping
Knowledge through experience and practical understanding helps the design of more suitable objects for the user (Preece, Rogers and Sharp, 2002). In order to do that without getting too far ahead in the development process of a concept or artefact prototypes are ideal. The fidelity in the prototype describes how close it is to the final product (Johansson and Arvola, 2007). The lower the fidelity the farther away is the resemblance to the final artefact.

4.5.1. Low-fidelity prototyping
There are several different ways of doing low-Fi prototypes. The main thing they have in common is that they are very crude and to really interact with it people who fake the
Interactivity are required. Physical low-fi prototypes can be built with a lot of materials and are ideal to get a general knowledge of the concept (Saffer, 2010).

Lo-fi prototypes seemed a suitable method in this case, as installations are time consuming and expensive. So to get feedback and still be able to improve and change the installations low-fi prototypes are valuable.

4.5.2. Mid-fidelity prototyping
In most literature prototypes are referred to as low or high fidelity (Engelberg and Seffah, 2002). High-fidelity prototypes mostly function exactly as the end product should (Saffer 2007). Therefore high-fi prototyping is much more time consuming and costly than low-fi prototyping. Installations are time consuming and costly. Mid-fi is, as the term suggests lies between high-fidelity and low-fidelity prototyping. Its functionality is not as primitive as a low-fidelity prototype but still not close enough to the end product to be called high-fidelity (Engelberg and Seffah, 2002). For this project it is more convenient to use a mid-fidelity prototype due to the limitations. Table 1 explains fidelities in accordance of the appearance, optimal use, advantages and limitations (Engelberg and Seffah, 2002).

<table>
<thead>
<tr>
<th>Fidelity</th>
<th>Appearance</th>
<th>Optimal uses</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Rough sketch; highly schematic and approximate. Little or no interactive functionality.</td>
<td>Early design: conceptualizing and envisioning the application.</td>
<td>Low cost: useful communication vehicle; proof of concept.</td>
<td>Limited usefulness after requirements established; limitations in usability testing</td>
</tr>
<tr>
<td>Mid</td>
<td>Fairly detailed and complete but objects are presented in schematic or approximate form. Provides simulated interactive functionality and full navigation.</td>
<td>Designing and evaluating most interactive aspects, including navigation, functionality, content, layout and terminology.</td>
<td>Much lower cost and time as compared to high fidelity; detail is sufficient for usability testing; serves as a reference for the functional specification.</td>
<td>Does not fully communicate the look and feel of the final product; some limitations as a specification document.</td>
</tr>
<tr>
<td>High</td>
<td>Lifelike simulation of the final product; refined graphic design. Highly functional, but the look and feel might be simulated rather than real.</td>
<td>Marketing tool; training tool; simulation of advanced or highly interactive techniques.</td>
<td>High degree of functionality; fully interactive; defines look and feel of final product; serves as a living specification.</td>
<td>Expensive to develop; time consuming to build.</td>
</tr>
</tbody>
</table>

Table 1: Showing different types of fidelity in prototyping
4.6. Focus group
Involving users in the process of designing and making them cooperate with professionals helps to see the field in a different way and new perspectives (Ehn, 1989). Focus groups are objective ways to evaluate the concept in its early stage and to find out how to make them more interesting and useful (Rubin and Chisnell, 2008). Focus groups explore in depth how end users think and feel (Rubin and Chisnell, 2008). They tend to deliver more qualitative information. Not to forget is that the users might act differently when using a product than they say when being in the focus group. To help improve the results focus groups can be mixed with walkthroughs of the concept (Rubin and Chisnell, 2008).

4.7. Usability testing
Naturally users reaction to prototypes in user centred design needs to be tested for their usability. User testing is done to experiment users solving tasks involving the artefact (Preece, Rogers and Sharp, 2002). Before starting the user test with the participant one needs to plan the test carefully as to be sure to get results to the issue at hand (Preece, Rogers and Sharp, 2002). The recording of the user test is important as to make it possible to later when analysing the date go back and recheck answers and reactions. Usability testing is especially helpful when evaluating prototypes (Preece, Rogers and Sharp, 2002).
5. Field studies

Putting the methods described before into use is not sufficient. To see the different patterns that came forth in different methods they need to be collected, summarised and finally analysed to form better understanding. Together with the theory the information gathered from the field studies can be used to go on to the next step and start designing.

5.1. Observation cultural heritage museums in Scania
There are some museums in Scania that focus on the local cultural heritage, two of them are Malmö Hus and Kulturen in Lund. Both offer insight into the historical development of the region but also about former lifestyles. And then there is Dunkers Kulturhus in Helsingborg. After visiting all of them it was decided to focus specifically on Dunkers Kulturhus. Dunkers Kulturhus offered as much time to be spent as wanted in their exhibitions observing their visitors. On the first visit of Dunkers Kulturhus the exhibition was shown by a pedagogue of the museum and the intention of the exhibitions and different interactive parts were explained. The second visit included use of the audio-guide to get a better understanding of the exhibitions and to feel like a visitor. The third visit, was on a weekend due to the lack of people during week time, focused on observing the people in the exhibitions. The recording of the information seen and heard in the exhibitions was done by writing it down but mostly with the help of a mobile phone. It seemed natural to play with a phone to avoid being too obvious and melt naturally into the environment. Some of the pictures were taken of parts of the exhibitions. Notes were typed into the phone to access in a later stage.

5.1.1. Dunkers Kulturhus På Gränsen
What makes this exhibition remarkable is that the different spaces are not chronological in a timeline but by themes. This way it is possible to compare different times easily also in relation in how the people live today. From famous to unknown, different people get to talk about their lives. The audio-guide is quite interesting as it is like you are in the exhibition with two small girls, while the girls at times time-travel and meet people from different times in Helsingborg’s history. The idea is to enable visitors to feel more involved in the history and the people in it less far away. The
hardest part while they told a long story on the audio guide was to find where to focus and look while listening. The connection to the artefacts was at times missed. One of the installations first shown by Dunker’s pedagogue was three bicycles in different sizes in front of a screen showing movies of Helsingborg.

![Figure 1: Bicycles in the exhibition “På Gränsen”](image)

Initially the film was to start when the visitor started bicycling to get a feeling of riding through Helsingborg. But due to financial issues the film rolls on whether a person is bicycling or not and does not react to the cyclist’s speed or movement. During the observation the bicycles were used often. While on the bicycle people didn’t seem to mind the film not corresponding with how much they bicycled. When the camera in the film did a sharp turn some of the cyclists reacted surprised and it seemed as if they were drawn into it anyway. It seemed like observing bicyclers outside in the streets just that they were cycling on the same spot for the onlooker. A pair was having a conversation about everyday things while using the bicycles and only paid attention to their surroundings in form of the film. Even though the film did not correspond to their movements they appeared to be intrigued by it. Another user-group was children who refused to leave the exhibition and agreed on meeting their parents later. Another
An interesting installation was in form of a tent against the wall with cushions on the floor and a neck rest on the wall.

![Image](image.png)

**Figure 2:** Tent to listen to ghost stories in the “På Gränsen” exhibition.

Out of the neck rest came voices but they were not really audible unless you were in close proximity. On the side of the installation there was a text explaining that if ghost stories wanted to be listened the possibility to sit down and lean on the neck to listen existed. Unfortunately during the observations no one was seen using them. Adults seemed to glance at it and turn away. This might be due to the installation requires sitting on a cushion on the floor. One of the popular things seen was a wall with a screen projected on to it in a small room with different play buttons under a text describing what it was, while above a slideshow of pictures occasionally with text were shown.
Figure 3: A possibility to watch old movies of Helsingborg at “På Gränsen”.

Some were old concerts that have been performed in Helsingborg or nearby theatres. The screen seems like fake touchscreen directly on the wall. Especially when somebody used it, people seemed to be drawn there. There were also cases where people showed that this was not the first time they visited the exhibition. They remembered rooms in the exhibition and voiced the wish to show the others of their group. The most active visitors were by far children, their parents and a slightly younger audience. Older visitors mostly seem to stroll through without getting active or touching things. Children also often seemed to take the lead and show older people how to use things and where to go.

5.1.2. Dunkers Kulturhus Christer Ströholm
Additionally to På Gränsen, Dunkers exhibition about Christer Ströholm was observed as it is part of the cultural heritage and offers some interactive installations. Christer Ströholm was a famous Swedish photographer most famous for his pictures of drag queens in Paris, France. Through a flyer at the beginning of the exhibition, children are targeted to already think about the exhibition they’re about to enter. These make them reflect about what they might be about to see and raises the alertness of what is to come.

Even though this is an art exhibition, it is of relevant to this study, as the photographs in a way show cultural heritage. This exhibition had an interactive part in the form of touch-screens that were set out like tables throughout the whole exhibition. They give...
the possibility to zoom in on photographs and on books about Christer Ströholm. It is possible, with a pen-like tool, to highlight different parts of the photograph. The picture can be turned to see it from different viewpoints and maybe discover a new take or perspective. One of Dunker’s pedagogues explained to me that these touch screens came especially handy in tours when something is needed to be explained or to get the audience to focus on one part of the picture. When nobody uses them a slide show with some of the photographs goes on. A red dot causes occasionally a ripple like a wave through the picture in the slide show to invite people to touch. While observing visitors in the exhibition it was noticed that it was mostly children that used it and in that way come in attention to the adult. An interesting observation was that in one case two children totally forgot about the picture and just drew on it instead for the fun of drawing. The children in a way acted as a guide to their elders in the use of the table. Most adults focused on the artwork on the wall and in a way went past the interactive part. Some adults glanced on the table while walking by but even though the red dot showed that it was for touching some people still ignored it. When it was used, most adults clicked on some pictures looked at them and then left. The multi-touch wasn’t found by adults as they just used one finger which makes it harder to discover the zoom and turn effect. This was also the case when the table was used to generate interest in it. Though when used by someone else people seemed interested and tried for themselves once the other person left. The only ones observed turning and zooming and using the pen-like tool were children that in their turn showed their parents. One might go so far as to think that the older generations still are inhibited to touch things in museums no one explicitly says are allowed. Lastly people connected to other types of museums than cultural heritage were consulted to get a more diverse view on the topic.

5.2. Interviews

First an interaction designer involved in the exhibition Storsjöodjurscentret in Svenstavik, Sweden was interviewed. To understand both the intention and the final result a visitor also contributed information. To get a more professional insight in how a museum works and past experiences with interactive digital installations and what they understand what it is people working in the museum industry were questioned. These
professionals are both from Switzerland and Scania, Sweden. One of the person interviewed works closely with the exhibition På Gränsen at Dunkers Kulturhus in Helsingborg. The outline for the questions asked for each interview is included in the appendix.

5.2.1. Storsjöoddjuretcentret in Svenstavik

While doing the research I came to hear about the exhibition, or how they choose to call it, a laboratory, Storsjöodjurscentret. It was recently created as a collaboration between interaction designers, architects and engineers in Svenstavik, Sweden and is about the lake monster that has been a legend (a Swedish Loch Ness monster). The exhibition is treated indeed as a laboratory. Visitors are to be researchers and because of this most of the exhibition is quite interactive and engaging. To understand the project contact was made with one of the interaction designers from Unsworn Industries, an interaction studio involved in the project and a visitor who had not long ago been to the exhibition. A focus point and goal from the creators was that they wanted the exhibition in itself be neutral to as if the lake monster existed or not. The visitor should come up with their own conclusion to this after the visit. This was confirmed by the visitor. Indeed she could not tell if the creators of the exhibition believed in the monster or not. People should also feel welcome to come back to do further research and they focus to invoke the feeling that it is a laboratory instead of an exhibition. Different parts of the exhibition were designed to fit different “users”. People have different tastes in how to learn about “stuff” some tend to want to explore by themselves, while some wanted to read about what others have done and see the history. The visitor that was talked thought the exhibition quite successful but got a feeling that it felt a bit childish at times. To the question why the exhibition was perceived as more interesting than others, came the answer that the love from the creators for the theme could be felt.

As to why this exhibition became a success might be the close collaboration between people of different professions. Thanks to the architects the space was very important and added more feeling and authenticity to the rooms. People from different fields can come with new insights in the creation of exhibitions instead of just using experts from museums (Wyman et al., 2011). Also that people were hands-on and able to touch and
do research for themselves was a positive experience as people could really pretend to or be actual researchers and leave their footprint.

A question in the design of the installation was how fast it should be over. In modern Western society speed is essential and people are used to getting information in an instant. From the literature and the interview with one of the designers of the exhibition it can be concluded that, as people are very different in how they act in museums, so must their interaction with different installations be. Some need more time, some less. They shouldn’t be constricted to a time frame but make their own explorations in the time they need.

5.2.2. Museum professionals

To understand what interactive exhibitions are seen as, various people working in the museum field but also working in different stages were contacted. It was important to get to know what they saw as interactive exhibitions and how they think it works in the field.

Interactive exhibitions were seen as installations visitors could touch and try, artefacts and messages that were presented with help of multimedia and virtual exhibitions on the internet.

The wishes, that they should entertain more visitors and give individual ways to access the information were expressed by the people interviewed. This individuality can be in form of stimulating different senses. People have different ways of learning. They get stimulated by hearing, by seeing or by touching. To grasp these different learning types new technique makes a great contribution. New media gives new and alternative possibilities but the professionals questioned stressed the importance that the museum’s exhibitions should not swamp with it. The danger of supplanting the attention directed towards the artefacts or messages with one towards the new technique should not be leapt into.

The most important thing when deciding to use a digital installation is that it is in line with the museums wishes and goals for a visitor experience.

Virtual exhibitions on the web are a great way to deepen knowledge about a topic without having to consider time and place but at the same time the attraction of the real artefact is missing.

Digital media gives the opportunity to inspect an artefact and in the same time be able
to get information that revolves around the artefact. It is a new level of immersion in a museum visit. The constant development in new techniques will hopefully allow people feel as if they have been teleported into the past. Modern museums are almost forced to offer audio guides nowadays to be in the competition. Classical built models of, for example, cities are experiencing a comeback, which shows the wish for tangibility in exhibitions. But it also reminds that museums are an ever changing business. Money, technique and interest always changes and influences how the museums are built.

5.2.3. Malmö Konsthall and Galleria Rostrum
To understand if some of the answers about installations applied only to cultural heritage museums or could also be said for other exhibitions like in this example an art gallery experts from gallery Rostrum and Malmö Konsthall were contacted. Both of them have experience in interactive media in their exhibits but different in their venue. Gallery Rostrum is a quite small gallery in the city of Malmö with different exhibitions from time to time. Contrary Malmö Konsthall is one of the largest exhibition halls for contemporary art in Europe. The interview with the expert from Rostrum which took place over the phone confirmed that people are not used to touching things in the museum. When people get that they are allowed to touch and interact, the response is mostly positive. She thought that people could feel irritation if the information couldn’t be obtained. If the visitor understood the artwork and has the courage to try can be influenced by the staff. Good staff can provide the sought information and get people to try. If a digitally improved interactive installation is necessary or and improvement depends solely on the artwork and the intended message. By e-mail about the same questions were asked of Malmö Konsthall. Due to the limitation an e-mail conversation as has compared to one on the phone the discussion did not get as deep as the former. From these two interviews carried out with professionals in museums connected to art comes the conclusion that the greatest similarity to cultural heritage museums is in the effect space has. Where and how you place things define the importance of it being there. Another resemblance is the old prejudice that visitors are not allowed to touch. The main difference could be said to be that the artist can decide the art work’s message and create something that is digitally interactive or not. While in the cultural heritage museum more limitations have to be faced and the digital interactive
installation has to be put in second place.

5.3. Storyboards
Part of the brainstorming was sketching scenarios as storyboards to help understand how a design could work. These were carried out as scene by scene showing how a visitor would visit an exhibition or use an installation. Basing the scenario on the observations to make them more realistic helped seeing situations that might occur and therefore reject them before prototyping. It helped to see more clearly if the interaction felt “fake” compared to the observation of visitors. Like this concepts could be dismissed before going too far. As an addition to the low-fi prototype the storyboard helped explain the concept to the experts or other people asked for advice.

5.4. Analysing the field work
Interactive storytelling fits quite well in an installation as it does not have an ending like cultural heritage. There is no end in sight as to what people can contribute and change. The example of the bicycles showed how people got involved without needing to recognize the technical aspects of the installation. The interviews confirmed how tangibility is sought after and that the most important aspect is that artefact or message have to be considered as the most and technology only second. Technology should not be used unless it is in favour of the exhibition and works well with its surroundings.

The observations show how people act differently in a museum. This mostly relates to their age though when encouraged people of all ages tend to get less shy in touching and using things. As the contact from Rostrum said with the help of capable staff and clear guidelines even the shiest might start interact with installations. The space and architecture of an exhibition is vital. Everything needs to go together to create a natural flow in the visit. Museums wish to start conversations and discussions. These are facts to consider when designing an installation in a cultural heritage museum for it to work.
6. Lo-fi prototype

The literature research showed the importance and value of an installation connecting to the spatial environment of an exhibition. Therefore it was necessary to design for a specific exhibition. The focus fell on “På Gränsen” in Dunkers culture house as the repeated qualitative research performed there resulted in specific insight on how the exhibition works as a whole (Ciolfi and McLoughlin, 2012). Considering all the information and conclusion drawn from the research the idea to create a planchette was formed. The first storyboard felt authentic and plausible. A planchette is a device which comes from spiritualism to connect with the dead or spirits. It is placed on a board with letters which form words or sentence when the planchette is drawn on it. The planchette is most famously shaped like a heart. The planchette in the exhibition is formed with four wooden slats connected. Up to seven people can participate by placing their fingers in the small black bowl which makes it even more ideal as it can be used by one person alone or in a small group (Carlotta). Tangible installations that can be used by small groups creates multiple ways of using an artefact while visible to more (Hornecker and Stifter, 2006).

Figure 4: The planchette in “På Gränsen” at Dunkers (Museum.helsingborg.se, 2014).
As the room were the planchette is placed in the exhibition centres around who you are and who the people in past were, the installation should also carry this distinct features.

6.1. How was it done

The low-fidelity prototypes were two different ones. Do understand how people interact a tangible version was created. To further explain the concept setting in a museums which would be harder with the paper prototype and to get insight and evaluation from experts a short-film was created.

6.1.1. Paper and glass prototype

The first prototype was a simple cardboard about the size of an A4 paper with all the letters of the alphabet, numbers and yes or no on it. The means as for the focus group to interact with it a simple shot glass was added instead of a real planchette similar to the one in the exhibit. The glass version of a planchette is practically the same and easy recognisable in its usage. The prototype can used by putting a finger on the glass and so move it to the letters, numbers or yes/no on the cardboard and in this way answer the question asked.

![Cardboard low-fidelity prototype](image)

*Figure 5: The cardboard low-fidelity prototype.*
6.1.2. Video scenario
The video was done as a slight stop motion film depicting a scene where a visitor goes to “På Gränsen” and enters the first room. From there on the person gets to use a planchette on a table in close proximity to the planchette in the exhibition. Adding to the experience the planchette is on a table that is surrounded partly by a curtain. The atmosphere needs to comply with the object to make it feel more mystical.

The video scenario was created as to explain the concept and show to the experts and so getting more useful critique.

6.2. Evaluation

The focus group was recorded on video and notes were taken during the discussions. Talking to experts about the video prototype was recorded by a voice recorder as well as taking notes.

6.2.1. Focus group
To get to know what people would expect from such an installation a focus group consisting of three individuals was formed. The real environment is important but in this case unfortunately hard to test in the test was done at home. To help create a bit of the feeling the focus group met at dusk and with candlelight. The cardboard and the glass were on a table to be used and to be the base of the discussion. One of the participants arrived a bit earlier as to be briefed to control the glass and answer possible questions. The participants all sat down and were first told a short summary of the exhibition and the specific room “Who are you”. They were the requested to start talking to the board. The prejudice that they would start this by asking “is anyone there” or “who are you” was refuted. Instantly the participants were asking questions jokingly about issues related to them personally. The reason might be that the connection to the planned setting was missing. The participants were concerned that they were missing guidance as was to ask and maybe they needed to get more guidance.

The second focus group was performed in a slightly different way. The participants sat down and discussed some points while using the board as a way to make their viewpoints come across. As in the first focus group the exhibition in Helsingborg and the first room was explained and were shown pictures of the exhibition. The first half
of the discussion was if the participant felt that they wanted to connect the questions to people in the exhibition. The participants agreed that this would change the way one would use the planchette. If the questions should centre around people or stories told in the room then help would be needed to find the right questions to ask them. But if main purpose was just to experience how and why people back in the day used the planchette, connecting the questions to people in the exhibition was felt unnecessary. They thought people would ask any type of questions which were confirmed by the first focus group who without any guiding immediately posed personal questions. As the second focus group pointed out the answers of the planchette would be translated in any way the user chose to. And if they chose to believe in it or just see harmless fun in it. These would be in context of the room as one is encouraged to ask “who am I?” and “who are you?” Both groups confirmed that the importance lies in asking the question out loud as other ways would destroy the image of the mystical and that one communicates with a spirit with the planchette. Putting this installation in context in the exhibition would in some way probably get people to discuss and communicate.

6.2.2. Feedback from professionals on video
The video was evaluated by sending it to some of the professionals working at Dunkers Kulturhus. The persons working are involved and know the exhibition quite well and can easily spot what would work and what not. Sitting down in the exhibition “På Gränsen” after the experts had seen the video sent to them some days before, they discussed how it could be implemented and its effects. Naturally the exhibition room where they have the planchette is complete and another artefact might feel disturbing. One possibility was to place the planchette and the table in a room intended for educational purposes which is a part of the exhibition. A suggestion was made that a sign could be y the planchette explaining that there is an option to try it out nearby. The response to the concept was mostly positive and they believed it would be interesting to see what kind of responses the visitors would have. People would probably need a bit of explanation when sitting down to use it and learn.

6.3. Conclusion
Two questions are asked right beside the planchette “Are you going to be successful in life? Ask people who are no longer living.” The concept should get people to play with
these idea and in this sense also look for themselves as it should be up to them to decide what to do with the information given by the board. In how they react to the board, what kind of questions they ask and how they interpret the answers they get to know more about who they are. The low fidelity prototypes showed that there was an interest in it but the circumstances in which it will be used must be guided. Without knowing why and “forcing” people to use it does not work as it does not let them have time to formulate a question. A more subtle approach is needed. What probably would help would be some guidelines placed by the planchette that can be used. Here some simple steps on how to use it could be given while still leaving most of it up to the user. If one wants to ask a person in the exhibition about their life, a personal question or a very general inquiry is open. All of those would suit the purpose of the exhibition as the message is that by learning about past and present visitors question themselves.
7. Final prototype

The final prototype was still about the same concept. To answer questions rising after
the former prototype a mid-fidelity prototype had to be developed. A question that
rose especially was if the technology would add to experience or be seen as a
hindrance of the real artefact.

7.1. How was it done

The planchette and board were formed after the originals at Dunkers. With the help of
Arduino and a servo the movement of the museums planchette was simulated to
move. Arduino is an open source electronics platform that helps creating interactive
tangible projects together with its software (Arduino.cc, 2014). A servo motor is a
device to help create movement and can control the position of the movement
(Sawicz, n.d.). Due to this being a mid-fidelity prototype it was decided to create a
simple interaction by only getting yes or no as answer to the question. The prototype
planchette’s looks were copied from the original and it was set on a box. The yes or no
written on the box also tried to be in the same style as the letters and numbers on the
original artefact.

Figure 6: The mid-fidelity prototype

Guidelines were written to help the user. In the test guidelines to using the planchette
lie beside it. These instructions can be accessed in the appendix part of this paper.

7.2. Testing the prototype

Firstly the participants were shown a slide show which was created to set them into
the exhibition “På Gränsen” as it was not possible to test in the original environment at
the moment. The slide show featured pictures of the first room in the exhibition
additionally to a description of the museum.

![Image](image.png)

**Figure 8: The first room of “På Gränsen”**

They were slightly directed in small steps towards the planchette and the original descriptions. At last they arrived at a step where they could try out the planchette by themselves. During this whole procedure they were encouraged to speak out loud and like in a real museum if they felt they didn’t want to read something to skip it. Removing the computer with the slideshow they sat in front of the mid-fidelity prototype with the guidelines beside it.

### 7.2.1. Evaluating the test

The test was with single users and one small group consisting of two people. To avoid conflict when changing slides they agreed on a sign to symbolize they finished reading as the more natural of walking away in a museum didn’t work in the artificial setting of the test. The single user went through the slide show quicker but seemed more engaged when using the planchette. This could be due to the fact that the people in the small group didn’t know each other very well. In all tests people seemed uncertain to what the planchette was and what it was called until coming to the sign with the description. A user even said it reminded her of a torture device. During the first tests a sentence was omitted from the guidelines and later added asking the participant to start by putting the finger on the planchette and asking a question. One participant thought it might be more interesting without the guidelines as one would have more possibilities to explore the object though the others were grateful to have access to it. Especially the small group who had the last sentence in the guidelines. A contestant
thought the guidelines and planchette should be styled older so the feeling of ancient times would be more present. The planchette prototype seemed to be indecisive but rather than irritation this got the testers to giggle and laugh at it. Only the small group said that the artefact seemed to fit in the exhibition theme. Most of them said they would probably try to use it if they would be in the exhibition and have the possibility to use it. The technology in the prototype seemed obvious but they would still use it. They expressed if it had been a planchette that was not digital they’ve would have looked at it and turn it around but probably not used in the sense it was made to use. The electronic planchette made them feel that they kind of got the sense how people have used it in the past.
8. Discussion and conclusion

8.1. Discussion and analysis
Digital technique should help the museum or exhibition to shine their shoes. One of the most importance things is not to forget that the artefact or story should be the centre and most important not the digital technique. Especially in the context of a historical exhibition the visitor should be helped to feel like they took a trip through time. Everyday life should influence the design of a digital interactive museum exhibition. How people get interested and involved in other activities can be the same as in museums. The objects should spark discussions and interest in the visitors. Most importantly one must realize that the audience comes first. Without the audience the artefact is unimportant (Simon, 2010). Interviews showed that professionals a lot of times agreed to some extent on the same values as previously found in the theory. The observations and conversations with the professional staff of “Dunkers Kulturhus” brought further insight into the working of that specific cultural heritage museum. Getting to know the exhibit “På Gränsen” helped a great deal in coming up with a proper concept. As found in the theory and through interviews the importance of fitting in and thinking about the environment of the installation. Having an exhibition and so their visitors as well that is known to the designer helps implementing the techniques of digital interactive storytelling in a correct manner. An installation on its own without any connections whatsoever to an exhibit in itself is pointless to this research as it wouldn’t answer questions. The environment was tried to be brought to the participant in the user testing of the prototypes as without the context the results wouldn’t be valuable. From the first focus group who tested the low-fidelity prototype the user test could be enhanced in the testing of the mid-fidelity prototype. The users connected the artefact, the planchette, with the exhibit and were so more eager in using it and answering the following questions. Based on the research and user tests installation using interactive digital storytelling is not a must for a modern cultural heritage museum to function but it can add to a visitors experience if implemented in correctly. This would mean leaving the spotlight on the original functionality of the artefact or centring on the story that needs to get across. In this case the planchette helped form an understanding of how the artefact was used and experiencing the
feeling people must have felt using the planchette. As a participant said having the object near tangible to touch would have been interesting to look at but would have been set down after inspecting it after a short while. It wouldn’t have formed a personal connection to the artefact as a user would when using it and getting a response.

8.2. Conclusion
In the papers written and also according to the professionals and experts talked to the assumption that the ideas what works and what not is divided. But some issues like not taking the focus of the artefact and the importance of space is mutually agreed on. Participatory museums in all fields are growing in interest and people still want to learn and experience from museums. The value of the core and essence of museum does not change. How we decide to experience it though changes. Seeing that even museums are changeable makes us realize that we can be a part of it. The desire to make own conclusions does exist. Objects that we can influence and explore triggers another level of understanding. Getting to feel and touch an artefact in a museum is not the main purpose and the most important feature when visiting but it does add to the learning and experience.

8.3. Self-critique
In the end of a research it easily seen what could have been approached differently and done better. The matter at hand is not to forget that this can partly be done because of the journey that was made. A problem of the study is that it is quantitative and lacks the clear evidence of a more qualitative research. Due to absence of practice in creating interviews beforehand some of the questions in the interviews were to open and general. Another difficulty is to focus on one thing instead of including everything possible. Focusing raises the quality instead of a lot of different half done right projects. During the research several exhibitions were visited and written about but in the end these were removed as not to confuse the reader and work more on the ones in the text now.

8.4. Future directions
If the project would be taken further the next step would be testing the mid-fidelity prototype in its original setting. From there one could collect the data together with
the other user test and come up with a high-fidelity prototype to test a last time. Things one could implement in a future prototype would be a more ancient look of the prototype. The guidelines should be written with the help of a pedagogue in the museum who knows more accurately how people react to written text and instructions. A more accurate movement of the planchette should be programmed in accordance with the time between the answers. Another step would be to create words instead of only yes or no answers and see how people react to random words in answer to their questioning.
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Personalization for Tangible Interaction in Cultural Heritage. UMAP.


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Table 1: Description of different fidelity types ranging between low to high (Engelberg and Seffah, 2002).
Appendix

Annex 1

Interview questions for the interaction designer involved in the Storsjödjurscenter

What was your goal in designing the exhibition Storsjöodjurscenter? How did you want the visitors to feel when they left?

What did you experience as one of the biggest difficulties in creating the exhibition?

Is there one thing you would have liked to known before starting the project?

In the exhibition people are made to feel as if they’re part of the research team at the same time you’re telling the timeline of the research that has been made. How did you balance the kind of “choose-your-own-adventure story and the more plot-driven stories?

How do you think you managed to keep the lab objective so as to let the visitors make up their own mind about the monster?

What do you think other exhibitions, installations or museum can take as inspiration from Storsjöodjurscenter?

Annex 2

Interview questions with the visitor to the “Storsjöodjurscenter”

1. Vad var ditt intryck med hela utställningen? Var den mer interressant än andra museer du varit på?
2. Hjälpt dig det digitala interakiva att förstå saker bättre?
3. Vad fick dig att tycka att det var mer för barn än vuxna? Vad skulle få dig som vuxen att uppskatta utställningen mer?

Annex 3
Interview questions with museums professionals in Switzerland

1. Was verstehst du unter digital interaktive Ausstellung?


3. Was würdest du dir von einer digital interaktiven Ausstellung wünschen?

4. Gibt es Stereotypen bei Besuchern in historischen Ausstellungen? Wenn möglich könntest du kurz ein paar auflisten?

5. Gibt es irgendwelche "Trends" bei Museum im Moment? Denkst du das sich Museen in Zukunft sehr verändern werden?

Annex 4

Interview questions with museum professionals in Sweden

Vad har du upplevt hjälper människor att uppleva historia på ett nytt sätt tack vare ny teknik?

Hur tycker du att man lyckas balansera så att fokusen inte skiftar från den historiska artefakten/händelsen till det tekniska?

När man skapar en installation anpassad till en historisk utställning vad är det man måste tänka på?

Vad är svårigheterna med att förmedla historisk innehåll genom ljud?

Upplever besökare installationer där de aktivt eller passivt medverkar som mer engagerande enligt dig? Eller beror de på innehållet man vill förmedla och målgrupp?
Annex 5

Interview with professionals in art museums in Sweden

Verkar besökare vara försiktiga i deras interaktion med interaktiva installationer de får röra?

Kan miljön runt om på verka interaktionen mellan besökaren och installation?

Ger konstverk man får röra och interagera med en annan upplevelse? Om ja, varför?

Annex 6

Guideline next to the mid-fidelity prototype in the user test

Välkommen,

Detta är en en psykograf som du såg i rummet “Vem är du?”.

Sätt dig ner och prate med oss. Kanske vi kan svara på några av dina frågor.

Glöm inte att vara trevlig så är vi också det!

(Lägg fingret på psykografen ochställ en fråga.)