Experiencing Play with Digital Heritage through Mobile AR Technology

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Abstract

The present work is based on the research and design of a mobile AR experiment performed in the context of the emerging interdisciplinary fields of digital heritage and experience design. In an attempt to find a method to support the justification and discovery of elements that can influence the user towards the fulfilment of an objective in a heritage experience, my experimental research reveals that a combination of play moments including elements of embodiment and sensuousness in mobile AR are most suitable to convey a story. Determining suitable gameplay and game mechanics requires an appropriate setting and context for a user’s encounter with digital heritage. My research outlines a design methodology to reveal how the aesthetics of mobile AR technology can be designed to support critical user experiences through play and discovery.

**Keywords:** designing digital heritage, mobile AR technology, gameplay, user experience methodology, aesthetics of technology, pleasures of play, embodiment.
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1 Introduction

The present work is based on the research and design of a mobile AR experiment performed in the context of the emerging interdisciplinary fields of digital heritage and experience design. Digital heritage combines academic, business, and cultural fields with the development of technology applications and focuses on the design of games, media and playful interactions to engage users in heritage sites and topics. User experience provides tools to the professional practice of designing consumption of information technologies with a focus on the specific interactions between users and technologies. Within this context, my research will investigate a series of design challenges developed for mobile AR that can impact and influence strategies for heritage professionals and those devoted to the promotion of culture as they work to include visitors in their sites and exhibitions. I will explore how history and legacy intersect with aesthetic practices, narrative content and select mobile AR technologies within the design process. In particular I will focus on the research and design of digital heritage experiences for users that involve embodiment, sensuality and pleasures of play.

The artifacts I use as the basis of my research consist of several screen views of environments developed in two different mobile AR applications. One AR application provides panoramic views of indoor and outdoor spaces and involves a surrounding image providing a complete 360 view for the user. The other AR application reproduces animated 3D models overlayed in environments that users observe through the camera view of a mobile device. The different AR visual experiences are designed so that users will participate with them in several different playful interactions. Each interaction simulates a specific game mechanic designed for each different AR view.

The experience is designed to target two types of audiences. Both groups have in common their familiarity with the city of Skövde because of the time they have lived in local Skövde neighborhoods. One target audience is young adults with high school education and with interest in design and games; the other target audience is older adults with an interest in handicrafts. These audiences are selected as they will best serve the content and context for the design experiments.

The working method applied facilitates iterative design methods and includes three different phases. It starts with a design experiment for target users in a laboratory environment. The results of the experience then provide materials for a second design phase with researchers and users, where an analysis of the results are gathered.

When the design of the experience has reached its third iteration, I will perform an evaluation of the target users consisting of semi-structured individual interviews after they have interacted with the AR experiences. The questions will be oriented to provide information for an assessment on the experience from the perspective of the user and to determine if a key message was conveyed through the story and as it was facilitated by the affordances of each AR experiences. The goal is to determine best
practices for users and design guidelines for these environments and media as they are applied to heritage contexts. The idea behind these results is to bring forward suggestions worth considering when designing digital heritage experiences. Some concepts central to my research are: Narrative, aesthetic experience and practice, embodiment, gameplay, ecological sense of perception and mobile AR technologies.
2 Background

2.1 Digital Heritage

The study of digital heritage poses many challenges because of its interdisciplinary nature. For this reason, it’s important to know what one means and what elements to consider when one designs for digital heritage. One must know which academic field is best to help focus the research. “Digital Heritage” is, in fact, a very broad term that can be approached from multiple disciplines, from cognitive science and engineering to humanities and art; One can depart from the definition of digital heritage authored by UNESCO in the context of an extended discussion on the relation between cultural heritage and digital technology based on the arguments about the relationship between material and digital objects, in the early years of this century.

Digital heritage’s standing as heritage has been a source of considerable debate over recent years. It is only recently that digital heritage has accorded status as an entity in its own right. The UNESCO Charter on the Preservation of Digital Heritage articulates this turn by creating a new legacy – the digital heritage: “resources of information and creative expression are increasingly produced, accessed and maintained in digital form, creating a new legacy—the digital heritage” [This sentence is quoted as an explicit objective by the European Commission Framework 6 Objectives for Cognitive Systems.]

(Cameron & Kenderdine, 2007, p. 5)

Fiona Cameron’s reference is useful for my discussion because she holds audience experiences at the center of her arguments for defining and understanding digital heritage. She claims heritage must include “the poetics and politics of the ‘digital’ historical object, the relationships between virtual and material objects and more abstract concepts of materiality, aura and authenticity, authority, interpretation, representation, knowledge, and affect.” (2007, p. 5). She considered heritage as something that involves the use of objects, beyond the traditional perspective institutions provided for digital heritage. Almost a decade later the discussion focuses on people’s experience with technology. Steven Wu and Herminia Din develop this concept more fully as they explain the complexity of digital heritage processes with culture and users:

Digital heritage today leverages on leading-edge information technologies and is underpinned by a host of processes including digital asset management and digital preservation. This burgeoning digital heritage ecosystem enables art, culture and technology professionals to co-create novel fusions of new media with historical and cultural artifacts

(Wu & Din, 2014, p. Introduction)

Along with these definitions of digital heritage process and use, I center on the principles of experience design. This is a discipline in the area of user experience that serves here as a framework to identify key aspects to observe and open up for analysis when lived moments are experienced by people interacting with technology. In the recent publication cited above on digital heritage practices, Steven Wu and Herminia Din recognize that the personalization of use is always important:
In addition to enhanced interactivity, digital heritage encounters and museum visits have also been elevated to a more personal, mobile experience. As more aspects of museum visits are being impacted by technology innovations, user experience evaluation has also evolved to capture and analyze the expanded range of user inputs.

(Wu & Din, 2014, p. xlviii)

2.2 Experience Design

A primary field of influence for me is user experience design. Each time I progress in a design phase it is because a particular aspect in the experience is being tested by users. An important aspect of my experimentation is the design of the experience in collaboration with users and designers as the means to assemble functionality with usability, to reach attitude and satisfaction, keeping in sight that our user is a social actor (McCarthy & Wright, 2004, p. 9), and as such, every action is deeply contextualized. I also borrow from McCarthy and Wright the relevance of “felt life” as experience when connected with people’s concerns, that is “the sensory and emotional intimacy of relationships between particular selves and others” (p. 77). I aim to design for experiences aligned to user needs, which supports their ordinary interactions by exploring places that seem familiar in some form. Things that we do in our everyday life, for instance, to remember, may turn into pleasant moments, in those encounters with heritage by using their memory and associating previous knowledge with new discoveries in the experience. I have the aspiration that users will engage in a “free to select” recollection of memories from experiences lived in or near of a specific historic place included as part of the design.

Linda Leung, one of the “survivors” of the dot.com boom at the end of the twentieth century describes what experience design is with a perspective of digital development during the last decades:

The “art” of experience design considers the holistic factors of a user experience that go beyond or extend the “science” of usability (Forlizzi & Bettarbee 2004: 261) Rather, it encompasses the more abstract, emotional and atmospheric elements of users’ digital interactions such as attraction, seduction and engagement. It is those aspects of digital experiences that are slippery, difficult to articulate or capture, and for which there are no heuristics or formulae. This is why we need to turn to and learn from the terminologies, methodologies and models of other disciplines that are already well versed in experience design


According to McCarthy and Wright in their book Technology as Experience this kind of design has a specific use and purpose connecting human users and designers: “Those who design, use and evaluate interactive systems need to be able to understand and analyze people’s felt experience with technology”. McCarthy and Wright refer to the relevance of

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technology in our everyday interactions and how deeply we are involved with it emotionally, intellectually and sensually (McCarthy & Wright, 2004, p. Preface).

In my research and in my experiments with design, I’m placing the intermediation of people interacting with technology at the core of the experience. Experience design offers the tools and platform appropriate to deal with unpredictable and subjective reactions and decision that often arise when being exposed to digital heritage; these experiences offer a unique context for experience design principles as they take account of “the fun, wonder, magic and enchantment of technology”. (McCarthy & Wright, 2004, p. 192)

With experience design in focus I draw concepts from other disciplines to understand user motivations and provide an overview of them in the following sections. Concepts such as aesthetics and ecological considerations provide the basis for understanding how users perceive the world, through and in digital technology; critical perspectives on play and gameplay help define the nature of relationships between multiple users in the same experiences and support designers who work to provide users with specific roles for their actions and decisions; aesthetic theories related to play support considerations of the experiences’ social dimension; narrative provides a perspective to explore and critique different strategies to convey core storylines in the experiences; an ontological perspective offers an understanding of the role of embodiment for users and the potential of user-play as it promotes their sense of self and identity. And finally, a review of two different mobile AR technology platforms offers a way to explore multiple perspectives for designing heritage perspectives with user experiences as a focal point

2.3 Aesthetics of experience

The process of defining elements in the experience offers a way to think about the aesthetic dimensions of technology. This includes not only the understanding of how our mechanisms of perception works, but of our individual choices, a basic factor of play, engaged by a user’s search to satisfy curiosity and pleasure. Further it exposes how our social circumstances and cultural determination affect us. Including the potential impact of my role as designer and observer participating in the development of the experience; with my own background in art history and wireless technology, my research is determined by such disciplines. Jay Bolter, Maria Engberg & Blair MacIntyre, experts on historical media studies and developers of the AR technology applied in this project, offer a historical perspective of media. They say such a perspective “helps us appreciate differences as well as similarities and develop a design vocabulary that is appropriate both to the affordances of the technology and to our current cultural moment” (2013, p. 45). They associate aesthetics with “affect, empathy and enchantment.” They propose a definition for “media aesthetics” (Feb 2014, p. 5) as an aesthetics related to how we experience digital interfaces, “how we perceive the world in and through technologies and new forms of media” (2013, p. 38). Other authors with an interest in interaction design, John McCarthy and Peter Wright, include in the term aesthetics a variety of affective and emotional responses to a designed artifact. These definitions coincide with other theorists of art, especially those from Germany at the early 20th Century. Since my experimentation is performed in the context of designers influenced by history of art, this is relevant because of the consideration of the term in association with art and with the understanding of the actual practice and applications at different historical moments. My perspective on aesthetics in the experience implies that the aesthetic practice is not exclusive
to artists, but rather it is also for our users, designers and participants on this experience’ production and achievement.\(^3\)

I concur with Bolter et al. that we can’t further talk about digital aesthetics and not refer to McLuhan’s definition of a medium as extending the senses (Feb 2014, p. 5). It is in the field of aesthetics today where we study the connection of our senses with our perceptions, and McLuhan’s perspective supports the media aesthetics approach used by Bolter and his group as it explores “all the ways in which our senses are called into play in our interactions with media”. Beyond McLuhan’s point of departure, I draw from Bolter et al. the relevance of how people are reconfigured when exposed to digital media and the importance of studying the multiple facets of this complex phenomenon; hence the need for interdisciplinary work in my research – physiological, contextual, technological considerations – as well as an explanation for why, in more than one aspect of the design of digital heritage experiences, the convergence of multiple areas of expertise takes place.

2.4 Aesthetics and play

Play is also relevant to user experience as we shall see in this project. Graeme Kirkpatrick confirms in *Aesthetic Theory and the Video Game* (2011) the relevance of studying the structures of feeling that define video games aesthetics, an area that he demonstrated has been taken for granted in many studies. His considerations of play coincide with other publications about the aesthetics of experience (Fishwick, P. ed, 2006), (McCarthy & Wright, 2004) in describing the ontological dimensions of play. For these researchers, it “is here [in play] that we first gain a sense of ourselves as agents who can act on the world and who must, in turn, adapt ourselves to its reality” (2011, p. 25). Kirkpatrick further assesses the aspect of form and its relation to sensory perceptions: “Aesthetic experience occurs when we find that something is pleasing to us by virtue of its form. Such an object stimulates us in the sense that it provokes and incites a feeling response, but it does so in a way that goes beyond merely being pleasing to the eye” (2011, p. 23). Form, in Kirkpatrick’s sense, is relevant to my work as I incorporate it as an interactable element of an embodied, sensory experience; Kirkpatrick illustrates his reflections in the relationship between hands and aesthetic experience with a role of controllers in certain video games. As a parallel with the following example, extracted from Kirkpatrick’s reflection, the user’s interaction with mobile AR technology is stimulated by the virtue of certain forms, and new knowledge is acquired in an act of re-discovery of the known world. At the same time, a re-discovery of the self occurs.

No one talks about pressing “X”, then “circle”, then “triangle” and no one feels that this is what they are doing, unless they are bored with the game, following a “walk through”, or using a cheat for the first time. Good play is about feeling and it seems that being able to feel what we are supposed to be feeling is, at least partly, a function of *not* looking at or thinking about our

\(^3\) In accordance with a post-digital context in studies of art “not at high art in the first instance but at the range of cultural uses for any particular media technology” (Bolter & Engberg, Feb 2014, p. 4)
hands. At the same time, it is powerfully determined by what we do with them.

(Kirkpatrick, 2011, p. 97)

2.4.1 Ontological Perspective

A constitutive aspect of an aesthetic experience – brought forward by the philosophers of experience such as John Dewey and Mikhail Bakhtin, and cited by McCarthy & Wright (2004, pp. 72-78) – is to see boundaries between humans and technologies as oriented towards their interactions and the settings in which they find themselves. “I only make sense of my self in terms of how I relate to others, always already in the present” (2004, p. 73) A second aspect in such boundary-making between humans and technologies is to consider them as “always open and becoming” and to understand how they “clarify and open us up to the potential and surprise that we might otherwise miss” (2004, p. 78).

In recognition of the importance that manifesting our individuality has in social relationships one may further consider here the consummation of ourselves in others:

The aesthetic experience for the self requires the other but also a return to self. It centers on the self, returning to itself to take advantage of its own surplus and outsideness. In this moment, the self is authored. Consummation of self entails a dialogue with the other –a meeting of two consciousnesses– that confirms the unique perspective and value of the self, allowing the self for a moment to experience unity and completeness.

John McCarthy & Peter Wright (2004, p. 75)

In an attempt to foreground aspects of the aesthetics of the experience relevant to my research, one can consider further how McCarthy and Wright extend principles of aesthetic experiences based on Bakhtin and Dewey:

We drew on the work of Dewey and Bakhtin to review lived, felt experience as prosaic, open, and unfinalizable, situated in the creativity of action and the dialogicality of meaning making, engaged in the potential of each moment at the same time as being responsive to the personal stories of self and others, sensual, emergent, and answerable.

John McCarthy and Peter Wright (2004, p. 184)

In my overview of aesthetics, I have illustrated how aesthetics in relation to technology and digital media forms coincide in the importance of their focus on individual experience. Kirkpatrick, McCarthy, Wright, Bakhtin and Dewey agree that it is equally important to recognize sensuousness as relevant to the experience as it is processes in the body, the dialogues among individuals constrained and released by their physicality. In other words, sensuousness is an internal, personal process; in the experience, participants have an external corporeality that, while setting their physical limits, allows them to sustain a projection of themselves through the interaction with the media.
2.5 Mobile AR technologies

2.5.1 Design Based on Experiences Using Mobile AR Panoramas

“An understanding of media history can suggest to us better approaches to designing artifacts” (Bolter, et al., 2013)

I take in consideration the studies of members at the Georgia Institute of Technology and the construction of digital media forms. In particular, I draw on studies led by Jay D. Bolter, Maria Engberg and Blair MacIntyre, (Bolter & Engberg, Feb 2014) (Bolter, et al., 2013); as well as the studies produced in Blekinge, Sweden by Rebecca Rouse “Negotiating Immersion and Critical Distance in Panoramic Forms from the 18th Century to Augmented Reality.” (2014) and Lissa Holloway-Attaway “Performing Materialities: Exploring Mixed Media Reality and Moby-Dick” (2014), on the history of media and the history of the panorama as an experienced medium. Additionally, I’m using the technology platform Argon3 developed in the research lab at Georgia Tech (and co-directed by Bolter and McIntyre) as a point of departure for the experimental work.

As described by the Argon researchers “Panoramas are part of a larger genre of mobile experiences that combine visual realities, present and past, live and recorded” (Bolter, et al., 2013, p. 42). Users of recent mobile devices, phones or tablets, can create and see panorama views through apps and other commercial easy-to-use intuitive software that allows the user to assemble panorama pictures taken by rotating the phone. There are a wide variety of applications from amateur users to professional photographers. In Argon3, the platform developed by Georgia Tech, there are augmented reality features added to the panorama views with audio and video content in 3D graphics, geo-spatial-positioning, computer-vision tracking (using Qualcomm’s Vuforia library), and multiple kinds of “reality” backgrounds, with panoramas and video (Georgia Tech Research Corporation, 2009-2015).

The basic feature of Argon3 relevant to my study is the capability of creating a “skybox”, feature exclusive to mobile devices. Engberg describes this as one in which “The viewer holds up the phone and rotates it around her to explore the surrounding image” (2013, p. 43).

Figure 1 Skybox for Père LaChaise cemetery (one side removed for clarity) Credit: Maria Engberg
Engberg also uses the term Polyaesthetics and applies it particularly to mobile AR experiences to describe “how various individual choices and cultural factors contribute to the reconfiguration” (Bolter & Engberg, Feb 2014, pp. 5-6). She suggests, “Different kinds of applications suggest different design vocabularies” (2013, p. 44) which confirms that user reconfigurations in mobile AR consist of many aspects including a redefinition of geographical space, user-views, sound, touch and proprioception:

Designers are encouraged to experiment with relationships between touch, sight, and sound: They come to see that they are designing not just a way of finding location-based information, but a way for the user to experience the world around her as a mixed and hybrid reality of information on the one hand and physical location and embodiment on the other.

Maria Engberg (2013, p. 44)

2.5.2 “Here and there” vs. Immersion and the Importance of Transparency

Bolter, Engberg and MacIntyre in their research on AR panoramas have confirmed that contemporary forms of panorama experiences do not encourage immersion as much as a mixed connection between the real and virtual worlds; the user is always aware of their presence in the real world and when holding a tablet or a mobile, she experiences a form of displacement. Hence they describe the “Here and there” feature of their AR experience:

Good photography and stitching can result in an image that appears seamless and more or less free of distortion. However, if the viewer is using a phone or even a tablet, she still cannot experience anything close to full visual immersion. The viewer is always somewhat aware of her physical surroundings, even when the panorama transports her elsewhere. In that sense she is both “here and there”

(Bolter, et al., 2013, pp. 42,43)

Avoiding being prescriptive about media specificity, as Bolter et al. warned, I don’t aim to work towards a feeling of immersion as within VR technologies. On the contrary, I believe that the features of this medium are suitable qualities for the objectives I have set in the experience, in which the users takes advantage of fluently moving in two environments. When exploring another space through the screen of a mobile phone or a tablet, the user focuses the attention in the virtual place; it offers an entry way, an alternative room, with vision as the leading sense. This is only possible when she consciously uses the body as a point of reference to perceive both environments, the real and the virtual. I’m using this quality of making conscious what is imperceptible, for being apparently obvious, in the design of the heritage experience as an ability for users required in the moment of play.

Transparency is a primary design feature I consider. Bolter et al. provide an historical perspective on panoramas and claim that in the past (pre-digital age), “The panorama was an attempt to create a transparent medium, a medium that would become invisible and leave the viewer in the presence of the objects being represented. Transparency was and remains a powerful media aesthetic that dates back hundreds of years” (2013, p. 42) Transparency in panoramas of digital mobile devices today is in many cases based on the ability of photographers and graphic producers. For the sake of my experience the aesthetics of panoramas in Argon contribute to the displacement by creating a virtual space that dimensionally makes sense in users proprioception without losing the dimensions of their
real setting, and in consequence, encouraging the consummation of the self of users in others.

2.5.3 Design Based on Experiences Using a Mobile Augmented Reality Viewer App

Augmented Reality 3D viewers, like Augment, allow to place life-size 3D models in your environment with or without the use of trackers (Boyajiant, 2015)

I am incorporating a commercial AR application as an alternative mobile AR application to the Argon app in the experience. Augment allows me to incorporate my own 3D models to a personal or sharable catalog of animated models without any specific notion of programming. It allows the users of my experience to rapidly and intuitively select and apply models in the mobile screen, change backgrounds, and add the models to my view in the screen and take pictures.

![Figure 2 Insertion of a 3D object in the mobile screen](image)

By incorporating the use of Augment in the experience I expect to identify how the distinctive characteristics of this technology supports user's playful moments. As in Argon the “here and there” features are present by providing the possibility to see 3D models through the mobile screen, static or animated, adjustable by using the fingers in the touch screen. Users can take pictures, just the same way a person would use the camera of a mobile
device. By working in teams, the experience with Augment consists of the creation of an embodied narrative displayed in four or more pictures.

Figure 3 Example of an embodied narrative where the user interact with an animation

### 2.6 Game Design

The design of the experience includes the incorporation of several play moments. Playing provides the users with a point of departure to establish relationships with other participants and also the means for deployment of the self.

I’m using principles of gameplay from Ernest Adams and Andrew Rollings’ literature oriented to educate on game design (Rollings & Adams, 2003). There I further study the construction of core mechanics, interactivity and storytelling.

I draw from the field of game design the definition of a primary gameplay mode for the experience that includes a clear definition of a setting, a model of interaction, challenges, actions and mechanics. What I am trying to accomplish by using some game design principles are primarily aspects of user experience inherent in games:

> [While fully accepting the contingency of action, we are keen to develop a stronger sense of the felt life and emotional quality of activity in our approach to experience. We are also keen to embed these dimensions in the sense making of the experience. Specifically I am referring to the affection, hopes, imagination [...] fears, frustration and anxieties [...]. These emotional, sense making aspects of experience seem underplayed in situated accounts of action.

(McCarthy & Wright, 2004, p. 8)
2.7 Narration

The original motivation for designing a digital heritage experience was for me to convey a story: A story each participant in the experience creates when s/he is motivated by being exposed to a heritage subject.

The narration consists of the construction of a particular story in layers. In the basic layer resides an argument that gives origin and context to the narration. Above this layer is the heritage-based content intended to reach an audience in the form of a proposal to engage them. In some of the play moments this proposal is presented in the form of a plot. The subsequent layers are constructed by the user with their actions and interpretations, providing a final destination for the story. This approach implies an emotional, unpredictable living of the heritage experience by the user; this is an abstraction of a conveyed story narrated in a way similar to games, rather than in a concrete from received by a traditional reader of a “text.” This is similar to what Andrew Rollings and Ernest Adams refer to concerning narrative in games. For them storytelling is inherent in all games:

The complexity and depth of that story depends on the game. At one extreme, in adventure games such as Grim Fandango, the game is the story. At the other extreme, it’s the player who tells the story by the act of playing. Even Tetris has a story – a story created by the player as she plays.

(Rollings & Adams, 2003, p. 9)

As referred in this citation, my goal is that the story gets interwoven with the actions and decisions the participants perform while playing.

In the case of the story built with Augment, the user creates an embodied narrative. Given the two basic layers, the participants in the experience construct a role-play story through playing.
3 Problem

My point of departure is to identify design alternatives to heritage experiences, borrowing some principles from game design to encourage involvement and pleasure. In the scope of this project I aim to explore mobile AR technology features that support sense activation and embodiment while taking into consideration user experiences and how they will interact: “What people feel is as important as what people do” (McCarthy & Wright, 2004, p. 9).

There is an intersection of narrative strategies with aesthetic practices when exploring alternatives to design experiences for digital heritage. The mobile AR technologies available today provide a rich opportunity to deploy content in a combination of real and virtual environments, opening possibilities for users to augment and extend their competences to perceive the world. I delve into what users feel is at the core of the experience through experimentation to understand the key moments when they engage with heritage. The design challenges are based on combining elements of sensuality, pleasures of play and embodiment when constructing meaningful content together with users. Through this process my core question is as follows: Is the combination of user experience theories applied to embodiment, game play and aesthetics of technology a suitable method for the design of narratives to be conveyed through mobile AR technologies?

Other related questions derive from experimentation with different applications with different affordances, as specific mobile AR technologies seem more suitable for certain target users. It is relevant to my research to reflect on motivations, factors occurring in the moment of the experience, that influence a sense of liveness for users, as well as the attitudes, actions and decisions of users when engaged in an experience. In this case I consider, for example, why one media is better suited than another for an audience and which media is better suited to a specific target group.

3.1 Applying User Experience Methods

3.1.1 Incorporating User Experience Models in the Evaluation of the Prototype

User Experience provides tools to support theories on understanding the experience of playing. I draw from models applied to video games as inspiration to a custom model to the prototype of this project.

The theory of the Core Elements of the Gaming Experience (CEGE) developed by PhD E.H. Calvillo-Gámez from Universidad Politécnica de San Luis Potosí, México (Calvillo-Gamez, Eduardo H.; Cairns, Paul; Cox, Anna L., 2010) sustain that it is possible to study experiences in the scope of scientific knowledge, even if they are understood as personal and transitory, by identifying properties in the moment of interaction that allow the user to achieve a goal. “In the interaction process, the environment is formed by the goal to be achieved, the tool to be used and the domain in which the interaction is taking place” (2010, p. 50).

The following step in the understanding of this theory, Dr. Calvillo-Gámez explains, is that an artefact or the application of the experience encourages the user to focus on the task:

In the interaction process, the individual is not focusing on the application at hand, but on the task being done (Heidegger, 1927). The actions performed by the individual using the application have resonance in the world (Winograd
and Flores, 1986), and even if the resonance is particular to the individual, the process of the interaction is common among many individuals.

(Calvillo-Gamez, Eduardo H.; Cairns, Paul; Cox, Anna L., 2010, p. 51)

Calvillo-Gamez claims that “looking at the process of experience, it is possible to study objectively and eventually generalise about experience”, Calvillo-Gámez further proposes:

In some sense, these theoretical approaches are top down, applying large frameworks to the study of gaming experience. Our approach is, by contrast, bottom up, approaching empirically the question of how the gaming experience feels in order to operationalise such concept within HCI. In order to measure or design for experience, we should be able to look at those elements of the interaction process that are common among users.

(2010, p. 53)

In his approach to the process of experience Calvillo-Gámez proposes to elaborate a theory based on previous knowledge or on a qualitative study, as the basis to the configuration of a model of variables. Latent variables constitute the theoretical constructs that provide structure to the process. Observable variables are a detailed list of relevant actions and attitudes that can be observable during the process of the experience. Each group of observable variables depends on a latent variable.

From the model configured by latent and observable variables a questionnaire is derived, as the means for the users to provide feedback after living the experience.

I draw from the Semantic Differential Methodology (SD methodology), a User Experience method by Philippe Lemay and Martin Maheux-Lessard, from Université de Montréal, Canada, the tools to analyse attitudes while playing:

This methodology allows researchers and designers to probe many aspects and questions related to attitudes towards games [...] Given the importance of attitudes orienting the cognitive and behavioural stance towards objects in general, and games in particular, such approach offers an appropriate research strategy related to players’ experience and could help designers develop significant insights into their target audiences.

(Lemay & Maheux-Lessard, 2010, p. 90)

The relevance of this theory for this project is the method to choose concepts and adjectives:

Semantic differential is a particular approach for probing the connotative meaning of objects, class of objects, or concepts, through the use of a list of bipolar adjectives (Osgood et al. 1957). Pairs of adjectives were chosen according to attitude theories and models as well as knowledge of the game domain.

(Lemay & Maheux-Lessard, 2010, p. 94)

The design of a questionnaire for the present project is inspired on the principles of the SD methodology to create bipolar adjectives users can identify with. Participants in the experience are asked to grade their identification with adjectives, listed with respective
opponents in a scale of 5 points. In the questionnaire adjectives are presented in the form of sentences. The questionnaire used in this project is included in Attachment D.

3.1.2 Identifying Components of the Experience Based on the CEGE Model

The CEGE model was designed to identify the components of a process in the experience. In the case study performed by Calvillo-Gamez to illustrate the CEGE model, the objective of assessing the core elements of the game experience is to achieve what he considered a positive experience that in his terms is understood as enjoyment when playing games “A positive experience (enjoyment) while playing games is achieved by the player’s perception of the video-game and the interaction with it” (2010, p. 63) According to him “Core elements are those necessary but not sufficient to ensure a positive experience” (2010, p. 55). The method of the CEGE model consists of formulating a theory to sustain the elaboration of a model: “The theory states that if elements are missing, then the experience would be negative. But if they are present, then the experience could be positive” (2010, p. 62)

The theory can be summarised in the following three points:

1. A positive experience (enjoyment) while playing games is achieved by the player’s perception of the video-game and the interaction with it. These are the Core Elements of Gaming Experience: Video-game and Puppetry.

2. Puppetry, the player’s interaction with the game is formed by the player’s sense of control and ownership. Control produces ownership, which in turn, produces enjoyment. Ownership is also produced by Facilitators to compensate the sense of control.

3. The player’s perception of the video-game is formed by the environment and the game-play, which also produces enjoyment.

All the elements just mentioned are latent variables. In order to observe the change in the Facilitators, for example, we have to be able to observe the forming elements, namely, Aesthetic Value, Time and Previous Experiences are observables variables. These relationships among variables can be modelled graphically in the following way: Latent variables are represented as circles and observables as squares. We draw an arrow from a causing variable to a receiving variable. In Fig. 4.1, we present the relationships among the different latent variables based on above statements.

All the latent variables depend on the observable variables. However, the observable variable is a consequence of the latent one. That is, the observable variable exists because it belongs to the construct specified by the latent variable (Nunnally and Bernstein 1994). See Fig. 4.2 for a graphical representation between latent and observable variables.

![Diagram](image)
Fig. 4.1 The CEGE Model: The figure depicts all the relationships among the latent variables. (a) Inside CEGE, Video-game and Puppetry produce Enjoyment. (b) Inside Puppetry, Control and Facilitators produce Ownership, which produces Enjoyment. (c) Inside Video-game, Game-play and Environment produce Enjoyment.

Fig. 4.2 The CEGE model: The figure depicts the relationships among observable (squares) and latent (circles) variables.

(Calvillo-Gamez, Eduardo H.; Cairns, Paul; Cox, Anna L., 2010, pp. 63-64)

I draw from the case study from Calvillo-Gamez the approach to the creation of a theory and a model. I followed the steps the author of the model suggests, to make an adaptation of the CEGE model to my case. These steps can be found later in this text, at the point 3.1.3.

In my approach to the definition of the elements in the experience, the objective is to explore and evaluate a design approach, and to bring forward suggestions worth considering when designing digital heritage experiences before the time and resources are invested in a final production involving AR mobile technology.

The design started with the selection and definition of the components of the experience. Working iteratively allows prototyping to begin early in the process with the advantage of redefining the design several times throughout experimentation within focus groups. The first design iteration served to define components of the experience based on the following theory: An alternative when designing digital heritage experiences is to take advantage of mobile AR technology by selecting components of the experience and their integration in playing interactions towards conveying a story. In my case, these components are: pleasures of play, aesthetics of technology and embodiment.
The aesthetics of technology and the embodiment are two of the three components that contribute to the creation of the story. The component Pleasures of Play incorporates the actions of the other two. The diagram above shows how the components relate to each other to meet the objective; the diagram below shows that I have selected two elements for each component. The two diagrams above and below are inspired on the CEGE model (discussed at length in section 3.1.1) proposed by Eduardo Calillo-Gámez in his assessment of elements of the gaming experience. (Calvillo-Gamez, Eduardo H.; Cairns, Paul; Cox, Anna L., 2010)

3.1.3 Theory, Model and Questionnaire

To define the components of the experience is necessary to prepare materials to apply an evaluation to users after participating in the experience.
Step 1. Create a theory. – A theory was created for this specific project following some of the steps of the case study presented by Calvillo-Gámez on video games (Calvillo-Gamez, Eduardo H.; Cairns, Paul; Cox, Anna L., 2010). Accordingly, the digital heritage experience is designed, in such a way that the participant is stimulated to find a personal meaning and connection to heritage. A form of conversation and social interaction then takes place in the encounters between users, developers and heritage.

Step 2. Create a model. – The following step in the application of a method based on the CEGE was to develop a model to evaluate the experience. A suitable method to complement the theory is to construct and assign observable variables to each component. I based this step on Calvillo-Gámez’s research for evaluation models and on his description on how to make the theory operative:

Once we have formulated the theory, we proceed to operationalise it. We do this in two ways: First, we create a model for the theory and then a questionnaire. The model provides an abstraction of the theory, which shows the relationship among the different elements of the theory. It identifies the elements in two categories, those that can be directly measured versus those that are theoretical constructs. The former are known as observable variables and the latter as latent variables, which allow us to understand the changes for the latent variables

(Calvillo-Gamez, Eduardo H.; Cairns, Paul; Cox, Anna L., 2010, p. 63)

Step 3. Create a questionnaire. - The questionnaire consists of a template that contains pairs of statements presented on both sides of a scale. Participants of the experience were asked to rate the activity according to the scale.

The elaboration of this questionnaire is based on the Semantic Differential Model by Philippe Lemay and Martin Maheux-Lessard from the Université de Montréal, Canada (Lemay & Maheux-Lessard, 2010):

Given the importance of attitudes orienting the cognitive and behavioural stance toward objects in general, and games in particular, researchers need to acquire the proper conceptual and methodological tools in order to investigate these significant aspects. This methodology allows researchers and designers to probe many aspects and questions related to attitudes toward games

(2010, p. Abstract)

The relevance of the SD methodology to the present project is the creation of pairs of adjectives and the use of a scale to grade them:

Semantic differential is a particular approach for probing the connotative meaning of objects, class of objects, or concepts, through the use of a list of bipolar adjectives (Osgood et al. 1957). Pairs of adjectives were chosen according to attitude theories and models as well as knowledge of the game domain

(2010, p. 94)
A case study was used by the authors P. Lemay & M. Maheux-Lessard to illustrate the method, a few of the adjectives from Lemay & Maheux-Lessard were adopted into the present project:

Benefits and limitations of this methodology must nevertheless be expressed. One of these issues relates to the choice of descriptors (pairs of adjectives). Because there is no well-defined or accepted corpus of such adjectives, each research project has to define their own set.

(Lemay & Maheux-Lessard, 2010, p. 103)

Example of the semantic differential question sheet by P.Lemay and M. Maheux-Lessard

(Lemay & Maheux-Lessard, 2010, p. 96)

A list of adjectives was created for the purpose of this project, most of them based on the observable variables of the SEGE. The adjectives were then transformed into sentences, with the objective to provide context and specific meaning to the adjectives.

The questionnaire was configured with pairs of sentences with a scale of 5 points between them. The template used in evaluations is presented in Appendix D.

3.1.4 Latent and Observable Variables of the Experience

A series of diagrams were developed to structure the evaluation of the components in the experience: Pleasures of Play (depicted as actions-play in the diagrams), Aesthetics of Technology (referred as sensuousness or sensorial experience) and Embodiment. These diagrams are available in Appendix B.

I referred in point 3.1.2 of this chapter that I’m drawing from the methodology used by Calvillo-Gamez in his CEGE Model which outlines the structure of a theory and a model to define the elements of an experience. Based on his model I created the following latent variables as theoretical constructs and represented them, as he did in his model, by ovals and circles. Observable variables are those that can be directly measured; here they are represented by rectangles or squares.
The following diagram describes how the elements of the play component, gameplay and game mechanics, served as media, as an interface to deliver a story. It also shows what actions constitute the mechanics and how the game play takes place.

The diagram represent two areas with different colours in the background. The area on the left are elements developed in the artefacts. The area on the right are elements of the play simulated during the focus group sessions.

3.2 Applying Social Research Methods

A social research methodology (Bryman, 2012) was applied along this project. The working method consisted in an iterative design based on monthly focus groups at an early stage in the design process.

In the evaluation a cross-sectional design was applied along with a combination of quantitative and qualitative methods. In a first part a quantitative method was applied to gather and to present data from the questionnaire. A second part was a combination of quantitative and qualitative methods, through semi-structured interviews and observation of the video-recorded focus group sessions.

A third stage of the evaluation was the analysis based on a cross-reference of the sources: questionnaire, observation and interview.

3.3 Iterative Design

During the early development process, I found that creating an alternative experience with the same three components and using the same elements in each component but with different AR mobile technologies would allow me to observe how the components affect the completion of the objective: to convey a core story to users. This reproduction of two similar
scenarios with different mobile AR technologies enables me to observe differences in users’ interactions. To test with two different target groups instead of one provides even more insight on the modalities of the experience. I add a further explanation of this change in 3.5. With this discovery, the prototype was revised into two experiences with two different artefacts developed in two different mobile AR apps: Argon3 and Augment; and two different target groups: local young students interested in cosplay, between 13 and 25 years old and local older potential handicraft enthusiasts, between 50 and 65 years old. Each AR mobile experience is designed with its own play moment. Both experiences are intended to convey the same story.

The message: Historically, women have played a fundamental role in the preservation of Swedish handicraft tradition.

The incorporation of play moments in each of the experiences aims to simulate game mechanics and primary gameplay that can potentially be integrated as part of the artefacts. Simulation can facilitate evaluating feasibility of elements before the investment is made on developing them in the artefact.

Two different artifacts with same story

1. Where in Skövde?
Exploration of panorama views and discovery of content
AR MOBILE TECHNOLOGY: ARGON3

Primary gameplay:
Be the first to identify the location of the place in the surrounding image

2. Tell me a story!
Build up a story sequence with pictures combining 3D models and role-playing
AR MOBILE TECHNOLOGY: AUGMENT

Primary gameplay:
Let your opponents guess your story by observing the sequence; if they assert, you win!

Figure 6 The experience includes two play moments. Winners of the first game can continue to the second play
4 Previous Research

4.1 A Pervasive Game Using Mobile AR Technology

I have previously participated in the development of heritage experiences using mobile AR technology. This pervasive game *The Mystery of Elin* was designed and developed in 2012 for the Municipality of Skövde, Sweden, as an educational tool for kids at the age of 8 to 10 years old. (Alvarez Diaz, et al., 2014)

I draw from this experience that the connection between the physical intention and the intellectual effort encourages long-term experiences. Only one of the 5 challenges in the game required the use of AR technology, and that challenge was the most popular. By using the camera, the GPS and the compass, features built in most mobile devices, the users walked around a historical area finding specific objects to photograph. When they finally identified the object and pointed the camera in front of the object to take the picture, a new screen popped-up providing a new clue and a reward in the form of image, sound and text.

![Image](image.png)

**Figure 13 Playing "The Mystery of Elin" (2013) new content is displayed when the object is seen through the camera**

In the game of *The Mystery of Elin* users felt empowered by the AR mobile to dig deeper into information otherwise not accessible at the moment of playing the game in the real world. In the design of my current experience, I’m trying to empower our users similarly by extending their ability to explore a different virtual space while being in the same physical place.

As in the Elin experience, I recognize the potential of combining real and virtual worlds with game mechanics in one experience, only that the focus in my present project is the consciousness of the self and the extensions of physicality through a mediated experience to construct new meanings.
4.2 An Artefact that Encourage Visitors’ Participation with Digital Devices

Another previous research project allowed me to learn the relevance of user participation in digital exhibitions in museums. This was a project that aimed to collect visitor data at a traveling exhibition (Alvarez Diaz, et al., 2015). This experience taught me the value of setting collective moments to encourage abstract conversations. Arriving to the exhibit hall users were invited to take a card and insert it in a console that would ask a question and when answered, an icon would display in a big screen visible from most points of the room. Depending on the answer, the icon integrated with other visitor icons forming chromatic moving compositions on the display. The visitor then found more consoles while walking through the exhibition, and each time the user registered the card, new questions appeared and with the answers a new icon was added to the composition. An application behind the console, which served as the interface, tracks the actions of the user and generated statistics that, through another internal interface, were translated into colour, size, space and rotation. When the user found out they could leave a noticeable footprint in a collective experience, it also left in her a permanent impression.

In my present project, I’m applying elements of user participation design of these consoles creating the settings to encourage moments of encounter with digital heritage. I also learned that different types of people engage in their own personalised terms, many times unexpectedly, when the design is focused on people and events through mediated experiences. Maybe the most important lesson from this former project that provides a foundation for my new project is that feedback to users is a strong engaging motivator. The benefit of incorporating game mechanics in experiences such as these implies a natural disposition for engagement. In games there is a wide variety of alternatives to provide feedback. Finally I learnt from this research that we can draw from the affordances of the technology to extend the boundaries of our manifestations in the experience.
5 Pilot: First Iteration Using Mobile AR Panoramas

The final prototype, presented in 5.1 and 5.2 has gone through four iterations. The first iteration was the pilot with a prototype consisting of experiencing panorama views, indoor and outdoor, of a historical site in central Skövde. The indoor view included an original picture of Lilli Zickerman, as a figure relevant to the preservation of textile traditions.

The basic message has remained the same from the beginning as a theme for users to enrich and develop forward. The pilot session aimed to motivate a discussion about the figure of Lilli Zickerman, handicrafts in general, textiles, new and traditional, or similar topics, which may bring forward clues about what kind of interests the target group have, so that we may pick up and develop them.

The pilot consisted of a focus group session with three participants, two men and one woman. Testers matched the target group: local adults between 50-65 years old with no special background or interest, but who might feel sympathy for traditions, history and handicrafts.

The test was 23 minutes long, followed by a discussion and a collective semi-structured interview of 36 minutes. It took place in a game laboratory environment where I had the opportunity to video-record the entire hour. The session was possible in team work with a 3D graphics student from the University of Skövde, Moa Andersson, who acted as moderator.

5.1 Participatory Observation, Video Recording and Interview

Participants were given iPads but one got an iPhone; I immediately observed that the perceptual impact was significantly higher with the iPads than with the mobile phone. It took some explanation and time for the participants to get used to looking at the panorama view, to rotate around, and to look at all the angles in the new room. I observed in all the
participants a strong sense of novelty and an interest in exploring and watching the details of the panoramas.

While exploring the panoramas, participants asked questions and made comments constantly regarding the technology and the content. The central subject of the discussion was about how those that are interested in the tradition of handicrafts and how, for those who wish to visit historical buildings or beautiful places – in the forest, for example - can benefit from exploring the views. They even suggested potential content and the addition of sound. They mentioned the potential of this experience to create awareness and even as a marketing tool.

In the first minutes of viewing the indoor panorama, comments were made about the discovery in the view of an image, which seemed to them old and original, of a lady working with a spinning wheel, which provided the moderator the opportunity to introduce Lilli Zickerman as a local relevant figure. As can be observed in the video, at this moment participants became less tense and more talkative between them. They seemed relieved by the conversation about this woman and her role in the preservation of Swedish weaving design with the moderator.

After testing the panoramas the group discussion was driven mostly towards answering the questions. Participants expressed interest about hearing more about the content; the feedback on the use of the technology was positive at all times. They expressed their amusement and the thrill of doing something completely new. They also expressed confusion for not being able to understand how other potential users like them could have access to the views.

5.2 Results of the First Iteration
The pilot provided insightful information that served as materials to a design meeting with other contributors to the artifact: Torbjörn Svensson, the photographer of the sites who also
assembled pictures to construct each panorama, and Moa Andersson, the student of 3D graphics who inserted historical pictures over the panorama views in Photoshop. Ideally the contribution of a programmer would have allowed us to use the extended features of the platform Argon3 to insert custom animated 3D models and video clips as content in the panoramas, but this must remain a potential future step.

The focal point for changes to the artefact was about improving the quality of the pictures, and the insertion of historical images with a focus on designing encounters with heritage as a focal point of the experience. The user’s feedback from the pilot confirmed that conveying a message through a mobile skybox seemed appropriate to our target group; when participants were exposed to the views, the medium seemed to smoothly and pleasantly involve the user, both physically and intellectually; Users’ postures and their expressions indicate, as observed in the video-session, a delightful transportation of “their selves” into the experience, while comments to other participants are about their personal discoveries mostly concerning the content. The need to suggest the theme of the experience and provide context about the heritage moment, gives origin to the idea of delivering the information in the shape of an award, since users demonstrated a sense of relief when they got to know better what the content of the experience was about. The results from discussion in the focus group motivated the design of playing interactions.

The possibility of observing video recordings confirmed how sensorial and embodied expressions influence the perception; it also reaffirmed that personal perception adjusts to a collective understanding of the content through sharing comments between users. Observable reactions, conscious and even unconscious actions are displayed, as proprioception, physical involvement, gestures and body posing. These components became basic contributors to convey the heritage message.

From the pilot study, I concluded that it seemed suitable to add a third component of play to define the interactions between participants and to be able to convey concrete information through rewards. The incorporation of game mechanics and gameplay would define the interactions in a natural context to deploy embodiment and sensuousness with enjoyment and excitement.

Figure 9 Focus Group discussion and collective interview
In sum, the prototype used in the pilot included two of the components of the experience: embodiment and aesthetics of technology (please refer to figures 4 and 5 on pages 15 and 16); it was designed for one target group only. After the pilot, the video-recording observation and the interview, provided feedback to incorporate basic elements for each component. The significant improvement was the inclusion of the third component Pleasures of Play to define the interaction between participants as the means to convey a story.
6 Progression in the Design

The experience as designed in the pilot seemed to reach the target group. However, promoters of culture have the ambition of reaching broader audiences through new technology. The target group in the pilot coincided to certain extent with the existing audience and attendees for local cultural events and visitors to local historical sites – families are a significant portion of this public, however, they are not included in the scope of this project. Is this experience suitable to reach younger audiences? Are specific mobile AR technologies more suitable to certain audiences than others? Can combining components of the experience – embodiment, sensuousness and the possibility to add play moments – with specific AR applications influence the result? In order to answer these questions, a second target group was added in the second iteration. In fact, the second iteration was one session with the younger target group. I found, in subsequent iterations, these questions relevant to the analysis of embodiment and sensuousness experienced by users, since these components exert their influence on the actions performed, towards conveying narratives.

6.1 Second Iteration - Including an Alternative Gameplay Moment with another Mobile AR Technology

The second iteration would ideally include more digital heritage content in the panorama views; however, it required programming to the AR panorama view platform Argon3 that was not available. The content to be introduced were handicraft tools modelled in 3D, such as a spinning wheel, a distaff, an embroidery frame and a tapestry; as well as the incorporation of a character: Lilli Zickerman in the form of a cat, developed and animated by a student from a previous course at the University of Skövde. Other mobile AR apps available in the market were revised searching for solutions to the integration of 3D models in the experience.

A solution found to incorporate 3D models in the experience was to utilize a separate application (or app) called Augment, that allow the manipulation of 3D models, objects and characters, without programming and through an amiable interface to users with little or no experience with mobile devices. Another feature that separated Augment from other apps in the market is that one could create a catalogue with models made by other users of the app as well as those made by oneself.

The incorporation of 3D models was important to motivate playful actions for younger audiences in the encounters with heritage. After analysing the needs of a different target group, a second personae emerged: a young adult, enthusiast of cosplay, which coincide with one of the target audiences cultural promoters are trying to reach. Particularly, these young adults are in need of new design ideas to be applied in a variety of materials they employ to create a custom image of themselves, inspired by narrated characters from their most esteemed stories. The theme of this particular experience had thousands of original traditional Swedish weaving design patterns as a central piece of digital heritage. The interactions in this gameplay moment should then be designed towards the encouragement of heritage narratives during those encounters. In this second iteration it was defined that two apps. were going to be used and two primary gameplays would be necessary, one for each app.
It was expected to get more feedback to gather concrete elements of each component in relation with the recently incorporated third component of gameplay, as one of the results of the second iteration. After the second session, it was possible to create a detailed list of elements for each of the three components, as well as actions in connection with each of those elements. For instance, Overlook in the experience with Augment, is an action from the component aesthetics of technology, derived from Choosing 3D Models, a game mechanic. Overlook is an example of how an action is derived from an observable variable (see Appendix C - Connection of Observables Variables with the Moments of Play, diagram Observable Variables when Playing “Tell me a Story!”) and Choosing 3D Models is an observable variable derived of the Game Mechanics, a theoretical construct (see diagram no.1). Game Mechanics and Gameplay are theoretical constructs of Pleasures of Play, the means for conveying narratives.

The selection of testers to the second session was carefully made and successfully counting with the ideal profile of participants for the test. This second iteration was performed with a group of four cosplay enthusiasts, women and men, equally distributed.

It was learned from this iteration to carefully refer to the content of the research project, in the invitation to participate, in order not to reveal information about the objective of the experience that might influence participants’ behaviour.

6.1.1 Including a Third Component: Gameplay

In the experience with Argon, the objective of incorporating a moment of gameplay in the experience is to motivate users to be exposed to the panorama view. Once the user is connected with the screen, as we learnt from the pilot, important actions that heighten a user’s engagement take place in the encounter. During the second session it was found, in the experience with Argon that those actions specifically are: exploration, observation and discovery of content. This gameplay can invoke memories, previous experiences and local knowledge about Skövde, all necessary to the quality of the experience.

The artefact of the second iteration included panorama views of multiple historical sites in the city of Skövde, indoor and outdoor. The views included pictures of traditional weaving as well as contemporary textile patterns designed in objects. Those pictures were inserted in the panorama views. The physical original objects were also placed in the laboratory apartment as if they were in their natural environment. The objective was to combine the digital experience with the physical contact with the heritage to encourage sensuousness and embodiment. The result in terms of the encouragement of narratives was not as expected, maybe due to information they received when they got invited to participate and maybe because the gameplay was not appropriate to encourage users to reflect on the theme of the experience. The following is a description of the results.

6.1.2 Selecting and Discarding Suitable Game Mechanics and Gameplay

In the second iteration several game mechanics were designed and tested with the target group of cosplay enthusiasts. A form of gameplay was performed, consisting of finding objects that exist in the panorama but also exist physically in the room. Those objects were various classic Swedish-designed handicrafts that were placed in various spots in the laboratory apartment (a laboratory room at the University of Skövde that simulates an
apartment). The same objects were available in the panorama views, highlighted by turning the panorama into a black & white image, which served as the background.

Figure 10 Black and white panorama view of historical captain dwellings in Skövde with handicrafted objects inserted

Figure 11 Black and white panorama view of indoor captain dwellings. Handicrafts are in colour. For instance, the cushion on the sled

The participants were divided in two teams. I observed that one team tended to be more reflective and the other team more competitive; the reflective team spent more time exploring and observing, and they won the points where the evocation was the key personal competence. They asked questions about the content and tried to understand why these objects were selected. The other group overlooked the details and focused on accomplishing the task to win. As a consequence one team showed disappointment in contrast to the other team that was winning almost all the points. Even though the mechanic was fun, the
competitiveness was hampering other important core elements: namely, the pleasures of play, embodiment and sensuousness.

From the gameplay within “Tell me a Story!” designed with Augment, I learned that creating a section of favourites in the catalogue and constraining the use of players to those models related to the theme can encourage users to choose the theme of the experience when creating stories. In this second session the users were distracted by the use of animations that were not related to the theme. However, it was decided to continue using those same animations in the subsequent sessions because the use of characters awakes the joy and the creativity in the participants when trying to think about a story. Without being able to fully develop animated characters for this project, maintaining two characters from the publicly shared catalogue of the app. in the next focus group was a good option, considering that the moderator could control future distractions from the theme through interventions during subsequent sessions.

Figure 12 The images and the story didn’t have a connection with the theme of the experience in the second iteration, the 3D character distracted their attention

6.2 Third Iteration - Including Two Target Groups

For the third iteration the artefact built in the app Argon had improved in the quality of panorama pictures, in terms of sharpness and illumination. The historical pictures were re-located in the panorama emerging more naturally from their position (figure 18). For the app. Augment the catalogue was reduced to four handicraft tools and the same two animated characters.

The focus group with two gameplay moments needed to be shorter, each session should take no longer than 15 minutes. That reduced the first experience “Where in Skövde?” to the identification of two sites: the house of handicrafts and the monument to Lilli Zickerman, eliminating the identification of objects in the physical room and in the virtual room. The second experience “Tell me a story!” changed by asking the participants to guess the opponent team’s story instead of focusing on creating one.

From this iteration and forward, two sessions per focus group were performed. The incorporation of two target groups allowed me to distinguish differences in the reactions of participants in two different gameplay moments. The recorded observations allowed me to
determine how the elements of embodiment and the aesthetics of technology took place in each of the gameplay moments.

One session was performed with an older target group, with the same profile as the older groups in previous sessions and the second group was of a younger profile. Instead of the cosplay enthusiasts from 16 to 25 years old, it was a group of teenagers of 14 years old, three female and one male, with no special interest in cosplay but in roleplay.

The group of teenagers was noticeably less enthusiastic about the entire experience and much more distracted by the technology itself. In the first experience exploring the panorama views, testers were finished very quickly and overlooked the details in the panoramas, describing the historical images as “ghosts women” (figure 20). There was no flow due to continuous adjustments to both apps. that the moderator and I tried to fix while the testers waited to re-start the actions. In the second experience, on manipulating and performing with the 3D models, testers completely overlooked the details in the objects and focused on the animated characters. The moderator encouraged participants to use the objects in their interactions with the characters, which helped to connect the sequences of pictures with the theme of the experience, but still, in the interviews, users manifested their lack of interest on building narratives that had something to do with the theme; rather, they were willing to create subjects of their own choosing in their interactions with the characters. The feedback from testers was that the younger the audience is the less interesting is to manipulate “old” objects like a carpet, or a spinning wheel. “old” or “historic” objects are considered “boring” according to their testimonies; they would have preferred to use objects with more contemporary uses such as ordinary objects in their natural environments: lamps, a ball, or fire, water, or even a flypaper would have been funnier to create a story about.

The results with the young group contrasted with the results of the session with the older group. The older group consisted of four participants, two married couples in their sixties, who found the first experience with Argon fascinating. Their knowledge about the city they have lived in for over 30 years was challenged; the recorded observations showed they really looked into the details in the panoramas and the historical pictures triggered interesting testimonies about how personal the encounter was with the handicraft traditions. The second experience with Augment was not as pleasant. The interviews as well as the recorded observations showed that it was very hard to manipulate the 3D models and in general to understand how the app worked. One team consisted of males and the other team of female participants. The female team built the sequence and the plot quickly, however, they were not so sure about how to create the story. They wondered whether they were supposed to write the story. That meant, at first, they needed an explanation about how to build a story based on a sequence of pictures. In comparison to the young group, it was not necessary to verbally encourage the participants to build the story on the theme.

The team of women was much attentive to a legend embroidered on one of the objects: “The place of woman is in the kitchen”, that along with the fact that one of the participants had broken a leg recently and needed to use crutches to walk, gave them enough material to create their story. The team of male members were very enthusiastic about taking pictures with multiple models. However, they could create a sequence, they rather guessed right the opponents story and allowed the team of women to build the story for them. The feedback from this experience allowed me to understand that, for the target group, creating a story based on a sequence of images is probably more appropriate to female participants. The
gameplay and the mechanics of this experience were not as pleasant, but the connection with the theme was successful. As result of this third iteration, in the fourth and last sessions, with the first experience “Where in Skövde?” I realized I needed to improve the views to have them pop-up promptly and smoothly. In previous focus groups, the moderator and I opened the views each time for the users by making a pause between panoramas. To improve the flow, we gave an iPad to each user instead, at the very beginning and let them deal with the bugs and delays themselves; they were taught how to open and use the applications. This increased a sense of control in users.

The change previously described was based on the testimony gathered from user experience research in the case studies cited from Calvillo-Gámez that helped to support this and other adjustments in the final focus group sessions. Calvillo-Gámez suggests that one of the components of the game experience that promotes satisfaction is the user's sense of control and ownership. During most of the focus sessions of this project, there were many technical delays between playing moments. However, the technical challenge was overcome by promoting the appropriation of the tablet from the beginning of the session. It was also helpful to improve the clarity of instructions and the introduction to each of the applications to encourage users to solve the technicalities themselves with continuous guidance.

6.2.1 Incorporating Rewards as an Alternative to the Integration of Two Apps in One Experience

The first play moment tended to be shorter and the second too long. I realized that users could have enjoyed longer exploring the panoramas and also, that learning to manipulate 3D models is time consuming. The experience seems more challenging in Augment also.

The third iteration showed that the gameplay with panorama views was more a personal experience than working in teams. Most of the actions were mainly introspective; share with others was mostly a comfortable, spontaneous discussion about the theme of the experience. Additionally it was observed that it was necessary to integrate both apps in a single experience. As consequence of these results two rewards were defined to link the apps, one would be a simulated cut scene revealing the content of the historical pictures inserted in the panorama views; the second reward consisted of winning a partner to the second gameplay with Augment.

The cut scene is illustrated with historical images showing handicraft objects in their original context. The simulation of the cut scene is a verbal presentation of the content, where, as part of the presentation, users are asked to open the second app to find those same objects but modelled in 3D and included in the catalogue of Augment.

6.3 Fourth iteration – Evaluation of AR experiences

The fourth iteration were the final sessions described in detail in chapter 7. The prototype had reached a development that allowed an evaluation to the target users after they interacted with the AR experiences. The questions are oriented to provide information for an assessment on the experience from the perspective of the user and to determine if a key message was conveyed through the story and as if it was facilitated by the affordances of each AR experiences.
7 Designing playful AR Interactions with Heritage in Mind

7.1 Description of Playing Moments
The prototype consist of the design of two gameplay moments in two different mobile AR technologies occurring subsequently; that is, one unfolds the next one. They occur in a laboratory environment within focus group sessions of 45 minutes with four participants.

Figure 16 Playing “Where in Skövde?” Using Argon3 to explore panorama views

Figure 17 Playing “Tell me a Story” Using Augment to manipulate 3D models

Both gameplay moments have the objective for users to experience digital heritage and at the same time to convey a story on women’s’ role in preserving handicraft traditions.

There are two artifacts constructed to play the experiences. It is necessary to download two apps. from the App Store for use on iPads or iPhones. These apps. are Argon3 and Augment. iPads are preferable in these experiences to enhance the appreciation of images in the screen.
Game mechanics and gameplay are simulated during the experience. Each of the two play moments are designed with a primary gameplay objective, along with the correspondent game mechanics.

### 7.1.1 The First Play Moment: “Where in Skövde”

![Figure 18 Indoor panorama view of the handicrafts atelier at a historical building in central Skövde. Photo: Torbjörn Svensson (2016)](image)

The first action consist of the exploration of panorama views and the discovery of content, content that has been added to the view:

![Figure 19 Original pictures are inserted over the panorama to trigger a sense of visual history of the place. Photo: Claes Ruderstam Archive (ca.1930)](image)
The gameplay is about being the first to figure out the location of the place navigated. While playing participants initially remain silent, observing the content, later, they start sharing with the other participants all they can think about the place and wonder what the meaning of the content found is. If players are not really sure about the location, they open the next view, which is the outdoor panorama of the same place and there, most of them identify the location.

Figure 20 Panorama view of Helens Park in central Skövde with the handicrafts house in focus and two ladies sitting by the stairs.

Figure 21 Lilli Zickerman and mother. Skövde Stadsmuseum (ca 1890)
Photo: Anders Sjölander
The reward of this first play is a capsule of information that simulates a cut scene, consisting of an oral presentation about the history and actual state of the location in Skövde discovered in the gameplay moment, illustrated with pictures presented in a large screen, revealing the content added to the panorama views. The capsule lasts less than one minute and introduces objects that later will be seen as 3D models.

![Image](image1.png)

**Figure 22** Players getting a capsule of information after winning the first play

Participants open the last panorama view and try to identify the location. Previously in the capsule they have been introduced to the historic figure of Lilli Zickerman, a prominent woman from Skövde who put together over 24,000 original textile patterns from the late 19th Century, from all over Sweden.

![Image](image2.png)

**Figure 23** Saint Sigfrid’s Cementery where a tribute took place at Lilli Zickerman’s burial monument. Photo: Torbjörn Svensson (2016)
The reward this time is to get a partner to the next level: they use a catalogue of handicraft tools to make a story with the help of a partner.

Figure 24 The capsule of information serves as a transition to the next AR app. In the image a spinning wheel can be seen in the capsule and in the AR catalogue.

Figure 25 In the image above players win a partner to the next round of play.

7.1.2 The Second Play Moment: “Tell Me a Story!”

The mechanics of this game consist of the act of taking pictures and create a story sequence. Players compose scenes using 3D models in combination with a partner who performs a role on the screen. The participants play in couples in sessions of two teams. At first, users take some time to learn how to retrieve models from the catalogue and adjust their size and position in the screen.

Figure 26 Team players choose either to pose and act or to take pictures.
The catalogue includes two animated characters to facilitate role-playing and to open more opportunities to create a story. However these characters, a ninja troll and a dancing skeleton, are drawn from the public catalogue for the app and are, subsequently, not directly related to the subject of the experience. Nevertheless their integration triggered joy and amusement without significantly distracting the players from the theme of the experience.

The gameplay consists of letting the opposing team guess the story by observing the sequence. If they are correct, the team wins.

Figure 28 This is the story of the winning team: "The place of women has always being in the kitchen" that's what she is embroidering. One day the woman slips with a mat when cleaning and broke a bone, now she is with the psychiatrist trying to find another appropriate place for her"
Figure 29 This is the story of the winning team: “A girl got a mat stolen and the police caught the thief. She made another mat, and also a smaller one and gave it to the thief”

7.2 Pleasures of Play, Embodiment and Aesthetics of Technology

The prototype of this project is built with three components: Aesthetics of technology, embodiment and pleasures of play, which are, in accordance with the CEGE model, theoretical constructs that serve to structure the experience.

Game mechanics and gameplay are elements through which the embodiment and the aesthetics of technology takes place, since they constitute the actions participants are supposed to perform when playing. During the process of development I systematically observed user interactions with the artefacts to understand the extent to which user naturally perform embodiment and sensuousness in each play moment.

As seen in the graphic above the three components of the experience have Pleasures of Play as a common area, inspired on the CEGE Model referred in chapter 3.1. Elements of
Embodiment and Aesthetics of Technology exert their influence on the actions users perform during the experience.

Appendix A includes three graphics showing the components that constitute the two primary play moments.

7.3 Evaluation

Four focus groups sessions were performed on a monthly basis as described in chapter 6. After the third iteration, a test evaluation was performed. It provided core insights about the construction of the model and the questionnaire. The final evaluation took place in the last two focus groups sessions, with a total of 7 participants from the two target groups.

7.3.1 Selection and Settings

Testers for the last focus groups were invited according to the target group they belonged. The younger group (four enthusiasts on cosplay) were gathered mostly via a Facebook message to a group of graphic game development students at the University of Skövde from the 3rd year and up, asking for cosplayers to participate in an experimental session with two apps. The four participants were all woman between 21 – 25 years old. We were unable to call testers with the specific characteristic of being interested by cosplay without avoiding them wondering the connection of the content with cosplay during the entire process of the experience. The older group was gathered by personal invitation. It included two married couples that have lived in the neighbourhood of Skövde most of their life, aged between 60 and 70 years old. The (initially) four participants of each target group knew each other, as in the previous focus groups. However, in this last session it was not possible to keep a gender balance in the younger group of participants as done in all previous focus groups, referred in chapter 6 Progression in the Design. Moreover, just at the beginning of the last focus group one of the women participants of the older group cancelled and there was no time to invite a replacement; due to that fact, the evaluation was performed by 7 participants: four in the young group session and three in the older group.

The test took place in a game laboratory that simulates a cozy living room of an apartment. The motivation behind gathering groups of people that know each other was to encourage a relaxed, ordinary environment. However, some tension was present when asking permission to video record the session. The moderator was the student of graphics in game development, Moa Andersson. I was participating as an observer and facilitator within each session. Testers were welcomed with an iPad that they kept throughout the testing session.

The session with the younger group lasted 35 minutes. 9 out of those minutes were used in playing Where in Skövde? using Argon3. The following 7 minutes were spent on controlling the 3D models and testing the features of the app Augment. 10 minutes were spent playing Tell me a Story! And the last 9 minutes were used to fill out the questionnaire and to perform the interviews.

The session with the older group was 45 minutes long. 12 out of those minutes were used in playing Where in Skövde? using Argon3. The following 13 minutes were spent on controlling the 3D models and testing the features of the app Augment. The last 20 minutes were spent playing Tell me a Story! Additional time was needed to fill out the questionnaire and to perform the interviews.
I used three methods for gathering information: 1) individual questionnaires; 2) a semi-structured interview; and 3) the video recordings of both sessions. The individual questionnaire was in the form of a template (presented in Attachment D). At the end of the test, users were invited to coffee and cookies and asked to fill out the template. While users filled out the form, a semi-structured interview based on three questions was applied individually.
8 Results and Analysis

8.1 Results from the Questionnaire

The following four graphics represent the sum of points users designated from each target group in each of the gameplay moments. They visually represent the differences on appreciation each group expressed in the questionnaire on gameplay moments with their respective technologies.

Grading is based on the opposition of statements. These tend to be more positive on the left side rather than on the right side.

The grading scale has a neutral central point. Grades could increase to the left or to the right depending on how much users identified to the sentence. The maximum number of points of the younger target group was from 8 to -8 because there were four participants and for the older group the scale was of 6 and -6 because they were 3 participants. The grading method seemed adequate to represent values from few testers. In this case there were 7 participants in total: four participants from one group and 3 participants from the other group. If a larger group of participants were to attend, the method to sum the points should be changed.

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<tr>
<td>Boring</td>
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<tr>
<td>I already know about this</td>
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</tr>
</tbody>
</table>
### Table 2: Play: Tell Me a Story! With Augment. Target Group: Cosplay Enthusiasts

<table>
<thead>
<tr>
<th>Measure</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make me feel skilled</td>
<td>6</td>
</tr>
<tr>
<td>Exciting</td>
<td>7</td>
</tr>
<tr>
<td>Relieving</td>
<td>5</td>
</tr>
<tr>
<td>My actions were familiar</td>
<td>7</td>
</tr>
<tr>
<td>Comfort</td>
<td>7</td>
</tr>
<tr>
<td>3D models are part of some content</td>
<td>6</td>
</tr>
<tr>
<td>Some models were suitable to make a story</td>
<td>4</td>
</tr>
<tr>
<td>The character and I performed together</td>
<td>6</td>
</tr>
<tr>
<td>What I see in the screen is real</td>
<td>3</td>
</tr>
<tr>
<td>I prefer to act than to take pictures</td>
<td>1</td>
</tr>
<tr>
<td>I wonder why we use these 3D models</td>
<td>2</td>
</tr>
<tr>
<td>I didn't have a reason to choose a model</td>
<td>-1</td>
</tr>
<tr>
<td>I feel comfortable posing</td>
<td>3</td>
</tr>
<tr>
<td>Frustration at moving the 3D models</td>
<td>1</td>
</tr>
<tr>
<td>I felt comfortable dancing</td>
<td>1</td>
</tr>
<tr>
<td>I didn't feel comfortable acting</td>
<td>-2</td>
</tr>
<tr>
<td>I didn't feel comfortable dancing</td>
<td>0</td>
</tr>
<tr>
<td>I didn't have an idea about a story</td>
<td>2</td>
</tr>
<tr>
<td>I didn't have an idea about a story</td>
<td>1</td>
</tr>
<tr>
<td>I didn't share my idea about the story</td>
<td>1</td>
</tr>
<tr>
<td>I let my partner do whatever he wanted</td>
<td>2</td>
</tr>
<tr>
<td>It was easy to create a sequence</td>
<td>6</td>
</tr>
<tr>
<td>It was difficult to create a sequence</td>
<td>-2</td>
</tr>
<tr>
<td>Our story was unrelated to the theme</td>
<td>3</td>
</tr>
<tr>
<td>I think my partner would have preferred other team</td>
<td>4</td>
</tr>
<tr>
<td>My partner didn't cooperate</td>
<td>3</td>
</tr>
<tr>
<td>To guess opponents story is fun</td>
<td>5</td>
</tr>
<tr>
<td>I could handle 3D models with my fingers</td>
<td>4</td>
</tr>
<tr>
<td>I'm a bit dissatisfied about the entire experiment</td>
<td>4</td>
</tr>
<tr>
<td>Is hard to control the app</td>
<td>-1</td>
</tr>
</tbody>
</table>

### Table 3: Play: Where in Skövde? With Argon3 Target Group: Wise Veterans

<table>
<thead>
<tr>
<th>Measure</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort</td>
<td>6</td>
</tr>
<tr>
<td>Relaxing</td>
<td>6</td>
</tr>
<tr>
<td>Make me feel skilled</td>
<td>2</td>
</tr>
<tr>
<td>Discomfort</td>
<td>4</td>
</tr>
<tr>
<td>My actions were familiar</td>
<td>3</td>
</tr>
<tr>
<td>My actions were strange</td>
<td>2</td>
</tr>
<tr>
<td>I realized I'm here and there (room in screen)</td>
<td>6</td>
</tr>
<tr>
<td>I perceived a story</td>
<td>5</td>
</tr>
<tr>
<td>I saw a bit of history</td>
<td>6</td>
</tr>
<tr>
<td>I kept my balance</td>
<td>5</td>
</tr>
<tr>
<td>It was exciting to explore</td>
<td>5</td>
</tr>
<tr>
<td>I was searching to see more in screen</td>
<td>3</td>
</tr>
<tr>
<td>I can guess there was a story</td>
<td>4</td>
</tr>
<tr>
<td>Maybe there is a story in this picture</td>
<td>5</td>
</tr>
<tr>
<td>The story seems attractive to me</td>
<td>6</td>
</tr>
<tr>
<td>The place in the screen seems important in Skövde</td>
<td>6</td>
</tr>
<tr>
<td>Expected This is new for me</td>
<td>5</td>
</tr>
<tr>
<td>The place seem to be any site in the city</td>
<td>4</td>
</tr>
</tbody>
</table>
### Table 4 Play: Tell Me a Story! With Augment Target Group: Wise Veterans

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make me feel skillful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Make me feel incompetent</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exciting</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxing</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My actions were familiar</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My actions were strange</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>The activity is slow</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The activity is fast</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td></td>
<td>6</td>
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<td></td>
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</tr>
<tr>
<td>Discomfort</td>
<td></td>
<td></td>
<td>1</td>
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<td></td>
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<tr>
<td>3D models are part of some content</td>
<td></td>
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</tr>
<tr>
<td>Some models were suitable to make a story</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The character and I performed together</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What I see in the screen is real</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I prefer to act than to take pictures</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>I prefer to take the pictures</td>
<td></td>
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<td>2</td>
<td></td>
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<tr>
<td>Pleasure moving the 3D models</td>
<td></td>
<td></td>
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<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frustration at moving the 3D models</td>
<td></td>
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<td>4</td>
<td></td>
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<tr>
<td>It was fun to stand still for the pictures</td>
<td></td>
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<td>5</td>
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<tr>
<td>I didn’t feel comfortable posing</td>
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<tr>
<td>It was fun to act for the pictures</td>
<td></td>
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<td>2</td>
<td></td>
</tr>
<tr>
<td>I didn’t feel comfortable acting</td>
<td></td>
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<td>3</td>
<td></td>
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<tr>
<td>It was fun to dance for the pictures</td>
<td></td>
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<td></td>
<td>4</td>
<td></td>
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<tr>
<td>I didn’t feel comfortable dancing</td>
<td></td>
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<td>5</td>
<td></td>
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<tr>
<td>My actions were familiar</td>
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<td>1</td>
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<td></td>
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<tr>
<td>My actions were strange</td>
<td></td>
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<td>2</td>
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<td></td>
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<tr>
<td>I had an idea about a story</td>
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<td></td>
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<tr>
<td>I didn’t have an idea about a story</td>
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<tr>
<td>My partner liked my idea</td>
<td></td>
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<tr>
<td>I didn’t share my idea about the story</td>
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<tr>
<td>We created the story together</td>
<td></td>
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<tr>
<td>I let my partner do whatever he wanted</td>
<td></td>
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<tr>
<td>It was easy to create a sequence</td>
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<tr>
<td>It was difficult to create a sequence</td>
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<tr>
<td>I enjoyed building a sequence</td>
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<td>3</td>
</tr>
<tr>
<td>It took a long time to come up with a story</td>
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<td>4</td>
</tr>
<tr>
<td>Our story had a connection with the theme</td>
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<td>5</td>
</tr>
<tr>
<td>Our story was unrelated to the theme</td>
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<tr>
<td>I think my partner enjoyed toasting up with me</td>
<td></td>
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</tr>
<tr>
<td>I think my partner would have preferred other team</td>
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<td>2</td>
</tr>
<tr>
<td>My story was good</td>
<td></td>
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<td>3</td>
</tr>
<tr>
<td>My partner didn’t cooperate</td>
<td></td>
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<td>4</td>
</tr>
<tr>
<td>To guess opponents story is fun</td>
<td></td>
<td></td>
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<td>5</td>
</tr>
<tr>
<td>To guess opponents story is annoying</td>
<td></td>
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<td></td>
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<tr>
<td>I could handle 3D models with my fingers</td>
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<td>1</td>
</tr>
<tr>
<td>I couldn’t handle 3D models with my fingers</td>
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<td>2</td>
</tr>
<tr>
<td>Lets see what all this is about</td>
<td></td>
<td></td>
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<td></td>
<td>3</td>
</tr>
<tr>
<td>I’m a bit disappointed about the entire experiment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Is easy to control the app</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Is hard to control the app</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

### 8.2 Results on Semi-Structured Interviews

The three open questions were: What is this about? What message did the experience content give you? And what stage did you think was the most fun?

Responses from the cosplay enthusiasts to the question “What is this about?” were different in each of the four cases: one tried to associate the technology with cosplay, another thought it was about the incorporation of history to the daily life; “To see how it was before and how it looks now in the same period of time”; the third participant thought it was about AR technology, and the fourth thought it was about how to attract people to Skövde through technology.

Responses from the older users to the question “What is this about?” were mostly about technology and games.

The second question as “What message do you think the experience content gave to you?” Responses were different in each case by the group of cosplayers: that Augmented Reality is fun; that it is possible to take advantage of the past; that Skövde can be an interesting place by giving examples of how to be creative through games; that “– without giving much thought about it – getting to know something very specific that I would otherwise never know about” This statement was translated from transcriptions in Attachment F.

Responses from the veterans to the second question were unspecific to the content but specific about the technology, with the exception of the female participant who thought that
the message was to see all around Skövde with the help of technology, that this experience provide an alternative to those that cannot physically visit places.

The third question: What stage did you think was the most fun? The second experience Tell me a story! Was unanimous answered by the younger group as a very or even extremely fun. They also add the following about the first play Where in Skövde?: “Is very fun to actually do something or not just watch” “the first was interesting but the second funnier” “it was exciting to do something for the first time, like spin around and be in other place was very cool”

Responses from the veterans to the third question was different with each of the three participants: for one of the male participants, it was the first phase “due to the fact I’m an old person from Skövde”; “the second was very difficult and I don’t have so much imagination”; for the second man it was the second because he enjoyed “laboring with pictures”. The woman answered neutrally as, for her, both experiences were very new to her.

8.3 Results from the observations

8.3.1 Cosplay Enthusiast Session
Participants began with great anticipation and excitement, looking around the apartment with curiosity. They maintained this atmosphere for the entire session: talkative and restless. However, soon they started to move around with confidence. There was flow in both gameplay moments. They were laughing during most part of the second gameplay experience.

In the first experience, they watched the panoramas on the iPad as if they were pictures; they were standing but held the tablet very still; it took a few instructions for them to start rotating their entire bodies. They extended their arms and watched the entire room, but only a few times.

The discovery of the animated characters grabbed their attention in most part of the second gameplay experience. They posed and performed with the characters with familiarity. Very few times, they chose the modelled objects to compose pictures.

8.3.2 Veterans Session
The participants entered the apartment with great energy and attentiveness. Confident and comfortable, they sat down on the sofa and started to converse. Their harmony was slightly interrupted when they asked for their permission to video-record the session.

In the first gameplay moment, they watched the panoramas on the iPad while standing, using their entire bodies and turning around to explore all the angles, observing details. I observed short and multiple comments, made with calm, mild voices, as well as expressions of fascination when looking at the panoramas.

Segments of silence during the session marked their concentration on the task. The first gameplay moment was fluent; the second was challenging because of what I asked of them, as they didn't understand the task: to make a story. Learning to move the models in the background, both the objects and the characters, seemed entertaining. Taking pictures
produced laughs. They chose modelled objects most of the times, and so they opened the application catalogue.

The first gameplay was mostly individual; they started to interact more after they listened to the information capsule, in a discussion about the subject. The second gameplay started after several attempts to figure out a common idea about what to do. Hesitant and uncomfortable two of the three team players completed the task while the third was neutrally sitting in the sofa.

8.4 Analysis of Components of the Experience

Summary of the analysis

The analysis consists of the identification of patterns in observable elements of the two play moments, providing information on both technology scenarios about how the combination of elements encourage a discussion on the theme of the experience between participants.

Broader Conclusion

According to my analysis, both technologies are suitable to convey the story if a combination of specific elements are in place. In the experience with Argon3, the method helped to identify four elements of the mechanics of play: evoke, observe, explore and discovery of content, that in combination with the recognition of self-presence, an element of embodiment, along with the sense of authenticity of historical pictures and sense of relief, can make Argon3 almost equally suitable to convey a story for both target groups. In the case of the experience with Augment, elements of embodiment, such as roleplay and sense of identity, demonstrated rich potential towards the objective of conveying a story with the development of animated characters.

Structure of the analysis

The interpretation of the results is structured in three sections with the objective of establishing differences between pairs of scenarios.

The first section refers to the play moment: “Where in Skövde?” in which the platform Argon3 is utilized.

The second section refers to the play moment “Tell Me a Story.” There the platform Augment has been used.

The third section includes a selection of elements from both play moments in which participants are explicitly asked to grade acknowledgment about the existence of a theme in the experience.

Description of the tables in 8.4.1, 8.4.2 and 8.4.3

Each table illustrates one play moment with the respective target group and technology. The column on the left enlists elements of the three components of the experience: Pleasures of
Play, Embodiment and Aesthetics of Technology. Elements in black represent embodiment and aesthetics of technology and are grouped by elements of pleasure of play, represented by orange colour. The grouping indicates a selection from the elements evaluated that exerted influence on the pleasures of play to encourage conveying the story.

Each element of embodiment and aesthetics of technology continue in the same row to the right section with the corresponding pair of sentences used in the questionnaire.

Grading is outlined in colours to identify each element of Pleasures of Play.

8.4.1 First Section. Playing Where in Skövde with Argon3

The curve of points overall in both target groups is similar and placed in its whole at the area of the statements of the left side. That is interpreted as a positive signal towards the
transmission of a message due to the fact that elements of evocation, observation and exploration are similarly graded as those of discovery of content.

The green curve corresponds to the extent of evocation users experienced looking at the panoramas. In the evocation, users draw from their memories, references to personal knowledge calling for information that can provide meaning to the image they are being exposed to. Gestures and postures observed in the video recordings confirm their comfort and fascination during the interaction. In their comments while playing, users make explicit references to the theme of the experience.

The green curve visually shows a very similar pattern in both target groups with the highest grades and lower grades in almost all the same items. The highest points in both groups are in the sense of authenticity of historical pictures, the level of comfort at performing the action, and the recognition of self-presence. Those are considered strong motivations to convey a story. The lower points refer to the low grade of complexity to handle the artifact and how naturally and conscientious their corporal movements were. The level of immersion is low in terms of displacement, which is expected when a part of their interaction requires from them to be conscious about their physical presence in the room.

The curve in brown demonstrates that the exploration is highly scored by both groups, but preferable for the younger group. Observation was the element of play and that was preferred by the older group. Both are considered indispensable elements in the gameplay moments to convey the story.

The Discovery of Content, represented with curves in red, are very near to the highest score. The list of elements of this group is displayed chronologically according to the stages observed in previous iterations, with the objective of visually present a tendency occurring in the moment of encounter with heritage: The tendency is gradually positive in the group of older testers, and this is probably due to the thrill of novelty, while in the younger group the score is high from the beginning and remains stable.

### 8.4.2 Section 2. Playing Tell Me a Story with Augment

<table>
<thead>
<tr>
<th>Is the story conveyed? Play: Tell Me a Story! Target Group: Cosplay Enthusiasts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elements of Embodiment and Aesthetics</strong></td>
</tr>
<tr>
<td><strong>Actions (pleasures of play)</strong></td>
</tr>
<tr>
<td>chose 3D models</td>
</tr>
<tr>
<td>overlooked: Some models were suitable to make a story</td>
</tr>
<tr>
<td>imagine: It was easy to create a sequence</td>
</tr>
<tr>
<td>create a sequence</td>
</tr>
<tr>
<td>hard to grasp: Our story had a connection with the theme</td>
</tr>
<tr>
<td>guess opponents story</td>
</tr>
<tr>
<td>other together story</td>
</tr>
<tr>
<td>provide feedback to partner</td>
</tr>
<tr>
<td>anticipate something happening: Let’s see what all this is about!</td>
</tr>
<tr>
<td>manipulate 3D models</td>
</tr>
</tbody>
</table>
The selection of elements of the group in blue was based on actions where users are expected to make recollections of the theme already revealed in the previous experience with the panorama views. The 3D models would trigger these recollections by referring to handicraft tools for textiles. To create a sequence represented a significant challenge to the older group, and it created some tension as observed in the video recordings as well. However, to create ideas in relation to the 3D models seemed suitable, since they succeeded in creating a story in connection with the theme. In contrast, the experience of the younger group was fluid, fun and comfortable, but it had no relation to the theme, and consequently, it was irrelevant to the objective of conveying the story.

The orange curves provide hints to motivate reasons why the story was not successfully conveyed as in the first play moment. The older group found it easier to manipulate the objects than the characters at the beginning, as confirmed by the observations. That maybe stated the path of creating a story that necessarily had to do with the theme. The characters facilitated the invention of their story. The orange curve of the gameplay moment with the younger group shows a low grading in general and a tendency overall toward the neutral point. This is interpreted that the experience was not very successful at conveying the story, even though it was very positive in multiple other aspects.

The pink curves of both groups show that the older group had more sense of control over the features of the application than the younger group. That is probably because the younger group had expected to manipulate the models as they do in other applications for game development. In contrast the older group was completely new to the technology and had no expectations at all. A selection of elements on the group in blue was based on actions where users are expected to make recollections of the theme already revealed in the previous experience with the panorama views and the capsule of information. One ambition with the 3D objects was to create ideas about how to establish relations with the 3D models.
8.4.3 Section 3. Analysis of Two Play Moments towards Conveying a Story

This section includes a selection of elements from both gameplay moments in which participants are explicitly asked to grade acknowledgment about the existence of a theme in the experience.

By looking at the curve of both target groups the lines of the gameplay moment, “Where in Skövde” shows a consistent pattern in both target groups favorable to conveying the story.

In the case of the second gameplay moment “Tell Me a Story!” and the younger target group, one can think that the objective of conveying the story was met, but only to a certain degree. However the fact that the story was hard to grasp establishes clear doubts about the completion of the objective. It is possible to change this result by developing characters related to the theme and not only objects. The experience of the older target group shows a tendency to the neutral point in those elements necessary to convey the story. Further modifications to the primary gameplay can probably encourage the involvement of users with the theme.

In summary, the attempt to a method to combine elements of the experience towards the objective of conveying a story seem to be suitable because it provides concrete elements that can be observed and measured in the design of digital heritage experiences. The results can be sorted according to specific analysis and this potentially provide hints and materials towards the solution of specific design problems.
9 Conclusions

9.1 Summary

The present work is an attempt to apply a method for the assessment of a heritage experience. This is a method to support the justification and discovery of elements that can influence the user towards the fulfilment of an objective in the experience. In any new design the method needs customization, and in the case of this project, the revision of multiple user experience cases and a study of feasibility was necessary to get a proper model. The method, allows changes in the design based on observable changes in the appreciation of the experience for users.

By developing an iterative methodology, I was able to reach a critical conclusion: A combination of gameplay moments including elements of embodiment and sensuousness in mobile AR are most suitable to convey a heritage-based story. Determining suitable gameplay and game mechanics requires an appropriate setting and context for a user’s encounter with digital heritage. Components in the experience, such as embodiment can be more dominant in 3D applications like Augment especially if gameplay is designed to encourage roleplay. Components in the experience that support embodiment tend to be more attractive to youthful audiences or to extroverted people. In terms of technology and its aesthetics, target audiences with apparent opposite characteristics are attracted in similar ways by the exploration of new virtual environments. The sense of novelty towards mobile technology contributes to a differentiation in what people may expect from a heritage experience. Older audiences are more fascinated with heritage messages when they are seen “through the eyes” of technology, while youngers find a sense of novelty in their encounters with digital heritage more so than in the actual technology itself.

A good degree of confidence was displayed by users while playing, particularly involving exploration of panorama views, and especially in the encounters with heritage content. The older target group felt more comfortable with the tasks of exploring, evoking and observing in their technology-assisted encounters, rather than in roleplaying or actions requiring more active participation.

3D models integrated into the gameplay greatly improve the design and overall experience for users. The development of an interface ad-hoc to this experience is important to overcome user’s discomfort when trying to control the display and movements of 3D models, or when considering how to change the game mechanics. I found that in the second gameplay experience, with Augment, it was necessary to further adjust the play component of the design, to fulfil the objective of conveying a story.

9.2 Discussion

My goal with this project is to build a bridge between game developers and people engaged in heritage preservation, by finding alternative solutions to the challenge of engaging audiences in the appropriation and understanding of heritage. The method proposed in this document aims to serve promoters of culture before investing and engaging in a project for the creation of heritage experiences within mobile AR.
This project has sought to maintain a balance in gender distribution through its inclusive design practices, such as in the configuration of test groups. In a similar way, I based practices with ethical principles on social research by procuring no harm to participants, carefully keeping them informed and asking their consent.

**Future Work**

This project has many elements for future development and research. One certain condition for development is the embedding of panorama views with heritage content in combination with animated 3D objects and character models. Further combined with a game engine this would support the simulated gameplay and mechanics outlined in my research. Further, it would be interesting to continue supporting iterative work by testing with parallel target groups periodically and evolving into more solid and fully developed interfaces and content to support user encounters with heritage. Finally, I hope to bridge the gap between designers and those responsible for heritage preservation by encouraging the developers to build technology-assisted content and scenarios using mobile AR applications combined with iterative design models.
References


## Appendix A - Components in Each Play Moment

### Embodiment - Design

<table>
<thead>
<tr>
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<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
<td></td>
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<td>X</td>
<td></td>
</tr>
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<td>Y</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>knowledge-based anonymous explore</td>
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<td></td>
<td>X</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**X** Tell me a story!  
**Y** Where in Skövde?

### Action - Pleasures of Play

<table>
<thead>
<tr>
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</tr>
<tr>
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<td>Y</td>
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<td></td>
<td></td>
<td>X</td>
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</tr>
<tr>
<td>remain standing</td>
<td>Y</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hold balance</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>act individually evoke</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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</tbody>
</table>

**X** Tell me a story!  
**Y** Where in Skövde?

### Sensuousness - Aesthetics

<table>
<thead>
<tr>
<th></th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>proprioceptive thrill of novelty present in another place anonymous sense of relief</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>sense of relief</td>
<td>Y</td>
<td></td>
<td></td>
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<td>X</td>
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</tbody>
</table>

**X** Tell me a story!  
**Y** Where in Skövde?
Appendix B - Latent and Observable Variables of component Embodiment and Aesthetics of Technology

The following diagram represent the observable variables that constitute the elements of the component Embodiment.
The following diagram enlists the observable variables that relate the sensorial experience.
Appendix C - Connection of Observables Variables with the Moments of Play

The following is a custom model for the present project, representing the components of the experience and their dependencies. This model is inspired on the CEGE model.
Observable Variables when Playing "Tell me a story!"

<table>
<thead>
<tr>
<th>Embodiment</th>
<th>Actions-play</th>
<th>Aesthetics - Sensuousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imagine (choose 3D models)</td>
<td>Choose 3D models</td>
<td>Overlook</td>
</tr>
<tr>
<td>Being part of the screen view</td>
<td>Take pictures</td>
<td>Frustration</td>
</tr>
<tr>
<td>Role preference (team)</td>
<td>Manipulate 3D models</td>
<td>Discomfort</td>
</tr>
<tr>
<td>Posturing</td>
<td>Perform</td>
<td></td>
</tr>
<tr>
<td>Act</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imagine (share ideas)</td>
<td>Share ideas</td>
<td>Sense of tension</td>
</tr>
<tr>
<td>Positive feedback to partner</td>
<td>Create a sequence</td>
<td>Challenging</td>
</tr>
<tr>
<td>Imagine (create a sequence)</td>
<td>Choose a role in the team</td>
<td>Hard to grasp</td>
</tr>
<tr>
<td>Being accepted in partnering</td>
<td>Define a story together</td>
<td>Disappointment</td>
</tr>
<tr>
<td></td>
<td>Guess opponents story</td>
<td>Sense of tension</td>
</tr>
<tr>
<td></td>
<td>Learn to use applications</td>
<td>Nuisance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anticipation of something happening</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Challenging</td>
</tr>
</tbody>
</table>
Appendix D - Model - Questionnaire

Tack för att du deltog i vårt test!

Vi har redan satt ihop några frågor som vi skulle önska att du fyller i.
Väsentligt fyll i den ruta som du tycker bäst beskriver din upplevelse av testet.
Det finns två påståenden och fem olika graderingar:

0 är neutral, där du känner att båda påståenden till viss del beskriver din upplevelse.
1 betyder att du håller med påståendet till viss del
och 2 att du håller med påståendet.

Var vänlig sätt endast en ruta per fråga.

![Questionnaire](https://example.com/questionnaire.png)
Appendix E - Observable variables and Sentences in the Questionnaire Template

The following is a list of the sentences derived from each observable variable of the components: Pleasures of Play, Aesthetics of Technology and Embodiment.

ARGON SECTION

Embodiment

In recognition of self-presence:

- I realized I’m here and there (room in screen)
- What I see in the screen is just a picture

- What I see in the screen is real
- What I see in the screen is somehow artificial

- My actions were familiar
- My actions were strange

Actions – Play

In sense of relief:

- Relaxing
- Stressful

In comfort:

- The activity is slow
- The activity is fast

In anxiety of not knowing:

- Skillful
- Incompetent

In realize the presence in two environments:

- Watching another place
- Feeling in another room

In sense of authenticity in historical pictures:
➢ I saw a bit of history
➢ Confused by seeing old pictures

In thrill of novelty:
➢ Exciting!
➢ This is new for me

In being present in another environment:
➢ I was somewhere else
➢ I saw another room

In sense of visual history of a place:
➢ The place is important
➢ It can be any place

In thrill of excitement:
➢ It was exciting to explore
➢ To explore was uninspiring

In proprioceptive:
➢ I kept my balance
➢ I felt disoriented

In curiosity:
➢ Searching to see more in the screen
➢ I realized I’ve seen it all

In confusion:
➢ I can guess there was a story
➢ I don’t know the content

In hard to grasp:
➢ Maybe there is a story in this pictures
➢ I don’t understand the content

In sense of self:
➢ The story seems attractive to me
➢ The content was not interesting to me
In discerning the narrative:

- I perceived a story
- I didn’t get a story
- I saw a bit of history
- Confused by seeing old pictures

In boredom:

- Fun
- Boring

In Discovery of content: (this is connected to the action not to the embodiment or sensuousness)

- 3D models are part of some content
- I wonder why we used these models

AUGMENT SECTION

In imagine:

- Some models were suitable to make a story

In being part of the screen view:

- The character and I performed together
- I look weird together with the 3D models

In role preference (team):

- I prefer to act in the pictures
- I prefer to take the pictures

In posturing:

- It was fun to pose for the pictures
- I didn’t feel comfortable posing
- My actions were familiar
- My actions were strange

In act:
➤ It was fun to act for the pictures

In dance:
➤ It was fun to dance for the pictures

In imagine:
➤ I had an idea about a story
➤ I didn’t have an idea about a story

In provide feedback to partner:
➤ We created the story together
➤ I let my partner do whatever she wanted

In imagine: (connected to create a sequence)
➤ It was easy to create a sequence
➤ It was difficult to create a sequence

In being accepted in partnering:
➤ I think my partner enjoyed teaming up with me
➤ I think my partner would have preferred other team

In overlook:
➤ I didn’t have a reason to choose a model

In frustration:
➤ Pleasure moving the 3D models
➤ Frustration at moving the 3D models

In discomfort:
➤ I didn’t feel comfortable posturing
➤ I didn’t feel comfortable acting
➤ I didn’t feel comfortable dancing

In sense of tension:
➤ I didn’t share my idea about the story
➤ My partner liked my idea

In challenging:
➤ I enjoyed building a sequence
- It took long time to come up with a story

In hard to grasp:
- Our story had a connection with the theme
- Our story was unrelated to the theme

In disappointment:
- I think my partner would have preferred other team

In sense of tension:
- My story was good
- My partner didn’t cooperate

In nuisance:
- To guess opponents story is fun
- To guess opponents story is annoying

In anticipation at something happening:
- Let’s see what all these is about
- I’m a bit disappointed about the entire experience

In Challenging: (connected to learn to use applications)
- Is easy to control the app
- Is hard to control the app

In Lear to use applications: (connected directly)
- It was easy to handle 3D models with my fingers
- It was hard to handle 3D models with my fingers
Appendix F - Transcriptions of the Interviews

Viktoria

Vad handlade detta om?

Viktoria: Wow, eftersom det var cosplayare som... Eh... kolla lite hur man kan använda sig av augmented reality för att eh... utveckla cosplay?

Känns ju kanske lite aktuellt då...


Viktoria: Ja men det är ju alltså det det typ känns mest. Eftersom ni informerade även om sånt här och så vidare. Så känns det som att det liksom är en grupp som ofta håller på med att skapa olika grejer och sånt där och kanske så att man kan använda sig utav mönster i Augmented Reality och sånt.

Vad för budskap tyckte du att upplevelsens innehåll gav dig?

Viktoria: Augmented Reality är roligt.

Vilken fas tyckte du var roligast?

Viktoria: Jaa alltså du såg ju våran fantastiska...

Jaa det var verkligen att man ville fälla en tår... aldrig berättat en så bra berättelse förut med fyra bilder... (detta var sagt sarkastiskt)

Matilda

Vad handlade detta om?

Matilda: Ja men inkorporera historier i vardagen. Att kunna se hur det var förr och hur det ser ut nu i samma skede.

Yeah like incorporating history into everyday life. To see how it was before and how it looks now in the same period of time

Vad för budskap tyckte du att upplevelsens innehåll gav dig?

Matilda: Ta vara på det som har hänt.
Vilken fas tyckte du var roligast?

Matilda: Den första var mest intressant, men den andra var roligast.

Julia

Vad handlade detta om?


Vad för budskap tyckte du att upplevelsens innehåll gav dig?

Julia: Menar du första eller andra nu?

Moa: Alltihopa.

Julia: Alltihopa? Eh... jag vet inte riktigt alltså för att... första delen tyckte jag var, det var ju lite typ såhär visa lite om Skövde och lite sådär att man kanske ska bli lite mer intresserad. Eh men som helhet kändes det mer typ såhär mycket för att visa upp typ det här kan man göra och även se i spel för att vara kreativ och sådär.

Vilken fas tyckte du var roligast?

Julia: Eh jag tyckte nog andra delen var roligast. Det är roligt att kunna göra någonting och inte bara titta.

Rebecca

Vad handlade detta om?

Rebecca: Eh... jag är fortfarande lite osäker men... det var... alltså man fick ju liksom en känsla att man var på en plats samtidigt så jag vet inte om man kanske skulle kunna... om man gör cosplays och så, eftersom du frågade efter cosplayare så kanske man har sin cosplay så kanske man kan ta bilderna när man liksom har en annan plats runt sig, eller så. Skulle jag kunna tänka mig? Vilket vore as coolt! Men...

Vad för budskap tyckte du att upplevelsens innehåll gav dig?

Nej men jag vet inte, jag har inte reflekterat så jätte mycket av hela den här grejen (tittar på skärmens bild av Lilly) det var ju såhär, det var ju spännande för jag hade ingen aning om nåt av det. Det låter ju super coolt:
Moa: Det var en ganska cool tant alltså

Rebecca: Ja det... verkar så.

Moa: Hon var väldigt entreprenör... missionär...

Rebecca: Mmm, mmm. Men, men hur jag ska sätta ihop det med det vi gjorde sen vet jag inte riktigt.

Vilken fas tyckte du var roligast?

Rebecca: Ja... men jag tyckte det var jätte kul med den där göra historia grejen. Men det var spännande också för jag har aldrig gjort en sån där grej när man liksom snurrar och så är man på en annan plats sådär det var ju super häftigt det med men... den andra delen var väldigt rolig.

**Kent**

Vad handlade detta om?

Kent: Vad det handlade om? Ja... det har väl lite med det här med IT-teknik att göra. Kan man väl säga?

Vad för budskap tyckte du att upplevelsens innehåll gav dig?

Kent: Det var ju en klurigare fråga... men det är vad det går att göra idag med 3 dimensionella bilder. Och hur man kan illustrera olika saker.

Vilken fas tyckte du var roligast?

Kent: Ja... nä... men det var väl roligt att laborera lite med bilder och fixa till de där så att säga.

**Rune**

Vad handlade detta om?

Rune: Ja grunden till ett spel.

Vad för budskap tyckte du att upplevelsens innehåll gav dig?

Rune: Ja det var ju ytterligare en bra fråga. Vad budskapet var från din sida eller från min sida.
Moa: Vad för budskap uppfattade du?

Rune: Vad jag uppfattade det...? Ja... Ja... Jag uppfattade det ju som att det var någonting som ni sökte. Någon typ av kärna som ni sökte.

Vilken fas tyckte du var roligast?

Rune: Det är klart att eftersom jag är en gammal Skövde bo så kan jag ju stan va. Och den andre delen eh den är ju svår för att ha en fantasi som med dessa bilder går att göra en historia i samband med en levande produkt. Det var ju enklast för mig var ju första bilden.

Marita

Vad handlade detta om?

Marita: Oj... eh... Jag vet inte. Jag har ingen datavana över huvud taget eller jag är ingen spelmänniska eller så. Så att jag vet inte faktiskt

Vad för budskap tyckte du att upplevelSENS innehåll gav dig?

Marita: Mmm... Jag vet inte men jag tänker så här kanske att... att du ska kunna eh jag tänker på när vi körde runt då med de här så du kan se hela Skövde och såvidare eller var du nu är. Jag tänker mig såhär att om en person som själv inte kan ta sig ut kan ändå vara med lite. Så tänker jag.

Vilken fas tyckte du var roligast?

Marita: Alltså eh... ja... jag vet inte om jag tycker att någon... det var roliga bägge två. Det var en ny upplevelse för mig helt enkelt.