Open Air Pedagogical Tools

An Inquiry into the Use of Technology and Historical Fiction in the Transmission of Intangible Cultural Heritage

An Interactive Qualifying Project Proposal
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Abstract

This project describes how to best use GPS mobile phones at Frilandsmuseet located in Lyngby, Denmark in order to interest the museum's unreceptive young adult audience. After applying participant observation techniques and interviewing museum curators and staff to assess the potential of using historical fiction to reach their young adult audience, the project team concludes that Frilandsmuseet should incorporate the use of a self guided tour implemented on their mobile phone platform in order to transmit intangible cultural heritage.

Executive Summary

Frilandsmuseet is an open air museum located in Lyngby, Denmark. The museum grounds include over 100 buildings that are spread across 120 acres of land. Buildings include manors, farms, cottages, poorhouses and windmills. Visitors include many classes of young students, families, dog walkers, artists, and buses filled with tourists. People looking for a place to walk or go for a picnic are also found touring the museum on a daily basis. The museum targets visitors and draws them into the museum with several activities including the use of costumed actors, plays, and a variety of tours. While this repertoire of activities is adequate in reaching a large majority of visitors, a gap exists between addressing young adults and several other visitors who quickly exhaust the museums resources and become bored. The museum desires a way for these patrons to see the museum through new eyes, a method for interrupting this audience's current thinking about the museum, and a way to expose these visitors to new ideas.

This project creates a tour that is implemented on the museum's mobile phone platform. The tour captures the attention of young adults while exposing them to intangible history. Intangible history of the museum is that which cannot be seen nor touched. It is the history of the superstitions, the feelings, and the moods of the past. Klaus Jensen, an IT professional for museum, taught the team how to use the technology of the phones while Rikke Ruhe, a museum curator, provided the team with detailed oral history pertaining to the buildings on the grounds. The project focuses on the development and construction of a tour concept that incorporates the oral history and intangible aspects of the museum. Success criteria on effectiveness of the tour were also created so the museum could test the concept in the future.

Incorporating intangible history into the tour is one way to draw a young audience into the museum. It targets this audience and forces them to think about how it would be to live in the past. To increase the potential of the tour, it should be expanded by adding characters, creating alterations to the script, and implementing already existing booklet tours. While examining the mobile phones and platform, it was discovered the technology must be improved and additional functionalities need to be added in order to test the tour concept and increase the complexity of the game. Once the technology has advanced and

the tour is implemented, the museum should evaluate the tour using questionnaires. In order maximize the experience of the tour, Frilandsmuseet can incorporate the local community by inviting artists and school children to paint the intangibles of the museum.

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Chapter 1: Introduction

Faster travel, open boarders, and information technology are but a few of the things making our world a smaller place and, unfortunately, evidence is plastered all over the news, from terrorism to taboo cartoons, that claustrophobia has begun to set in. Gone are the days where conformity and hard work were enough to survive in a society. Today societies everywhere are confronted by their coexistence with one another. Surrounded by different cultures, heritages, and beliefs, the society that adapts is now the society that learns, not just to tolerate its others, but to empathize and cooperate.

Empathy and open-mindedness go hand-in-hand and museums champion this cause through the conservation, continuation, and communication of the world's natural and cultural heritage, present and future, tangible and intangible (The International Council of Museums, 2006). They are charged with transporting the people of the present, not just into new perspectives of "The Past," but with communicating the idea of fellow humans as compendiums of different discrete moments in time. These moments are no more or less worthy than our own, only different. Conveying this idea is most important for our future, the world's youth and young adults, and yet these young adults have traditionally been the hardest demographic to reach through conventional museological means.

Denmark manifests this issue in a unique way. With just under 5.5 million people and 43 thousand square kilometers of land, the state of Denmark is a tiny place (Danish Census Data, 2006), yet with well over 12 hundred years of rich cultural heritage, Denmark reveals itself to be a giant amongst the world's contending historical traditions (Danish Ministry of Foreign Affairs, 2006). Predictably, the young adults of Denmark will not have to face the problem of national identity, or at least in the sense of lacking one; however, they will have to address the issue of peacefully assimilating waves of Muslim immigrants into their relatively homogenous society. This issue will demand great understanding from the future adults of Denmark and so over 700 museums and museum professionals are financed to vigilantly pursue the goal of educating the masses to welcome in new citizens and their ideas (visitdenmark.com, 2006).

Technology is becoming an integral part of this process due to its nearly unlimited potential to personalize learning. The Danish National Museum, for example, is working together with the Nordic Handscape Project to implement a system where patrons are able to retrieve local historical information from any location in all of Scandinavia through their GPS mobile phones. The Danish Nation Museum is running their pilot of this technology at Frilandsmuseet in Lyngby in hopes of catering to their young adult audience through the novelty of the technology and through its ability to augment what tangible exhibits the museum already has with intangible oral tradition.

This project explores the dialogue between the Danish National Museum and its younger patrons through the use of interviews and participant observation techniques while locating the potential of powerful interaction tools formed through the combined use of both newly incorporated technologies and Frilandsmuseet grounds. These tools are used to expand the museum's repertoire of design techniques to include elements of storytelling and fiction through the creation of a game design concept for the next generation of self guided tours. The project culminates in the discussion of how these tools and tours can move beyond their original role in the dialogue between the young adults and Frilandsmuseet to encompass the museum's entire audience and diversify the museum's relationship with its local community.

Chapter 2: Background

Due to the pioneering nature of this project within the professional museum community, a basic knowledge of the evolution of the museum is crucial to understanding the context within which this project incorporates new technologies at Frilandsmuseet. In order to improve the experiences of young adults at Frilandsmuseet, the elements of their experience must be understood as well as the consequences of using new technologies in the process of improvement. Finally the details of incorporating game design strategies into the project's methods for approaching the issue of young adults at Frilandsmuseet must also be understood.

2.1 The Changing Role of Museums in Society

Before museums became educational, countries used museums to demonstrate their wealth and power. Museums outlined a country's history and displayed remnants from past battles and goods of countries they had conquered (Hein, 1998). Beginning in the late 1800s, the role of the museum began to change. Museums started to be perceived as a means of educating the masses and a way of helping people teach themselves. For example, The South Kensington Museum, located in England, stressed the importance of proper hygiene and need for important eating habits (Hein, 1998). More recently, in 1992, the American Association of Museums published <u>Excellence and Equity: Education and the Public Dimension of Museums</u>. This document stressed the importance of museums and education, stating:

> "The community of museums in the United States shares the responsibility with other educational institutions to enrich learning opportunities for all individual and to nurture an enlightened, humane citizenry that appreciates the value of knowing about its past, is resourcefully and sensitively engaged in the present, and is determined to shape a future in which many experiences and many points of view are given voice (12)."

Teachers, who share this responsibility, view museums as an additional teaching tool, providing students with a closer look at material studied in their text books. Other methods that encourage an interactive approach to learning are currently making their way into classrooms. Traditional learning methods such as reading books, writing papers, and listening to lectures, are quickly becoming replaced by a vast spectrum of interactive methods.

Similarly to schools, museums have made a push to incorporating interactive learning into their exhibits. These museums include the Boston Museum of Science, the Exploratorium in San Francisco, Techniquest in the United Kingdom, and the Experimentarium in Denmark. For example, the Boston Museum of Science has developed a six-stage plan called "Science is an Activity" in order to show that science is fun and can be learned through interaction. Exhibits uses "hands-on, mind on" activities in order to achieve the goal which "enables visitors to recognize and practice their scientific thinking skills" and to "allow visitors to experience the scientific process by asking questions, formulating hypotheses, performing experiments, examining evidence and drawing conclusions" (MOS, 2006). Another example, the Children's Museum in Boston, Massachusetts is an example of a museum founded by teachers in order to facilitate children's learning (Moore, 2002). More information about what these specific museums are doing can be found in Appendix A.

2.1.1 Trends toward Interactive Learning

An interactive approach to learning can allow a person to utilize more of their senses to obtain information. A student who learns about Denmark in a classroom is at a big disadvantage to someone who actually visits the country. The student who travels to Denmark is getting a first-hand experience of what students in classrooms are only reading from other people's knowledge. According to Kuh et al. (1994), an ideal situation is for educators to create some type of blend of the two. Students should be able to draw a "connection" between what they learn inside the classroom and how to apply it to the real world.

This interaction between an individual and their environment creates personal learning. Jerry Wellington points out that interactive learning creates skills in students (as cited in Semper, 1990) and, as stated by George Hein (as cited in Caulton, 1998), interactive museum exhibits "recognize the significance of learning from experience."

Many museums today are incorporating hands-on activities into their exhibits. A hands-on exhibit is one that can be touched and interacted with. They encourage the users to touch, smell, build and play. A good hands-on exhibit works with a wide range of ages and conveys one particular lesson (Caulton, 1998), allowing users to learn by themselves and create their own conclusions instead of being forced to learn in one specific way (Semper, 1990). Hands-on exhibits promote interaction between the visitor and the exhibit in hope of creating exciting and entertaining experiences (Quinn, 1990). Exhibits range from pulling levers and pushing buttons to manipulating technologically advanced multimedia equipment.

Open air museums, such as the Frilandsmuseet in Lyngby, Denmark, or Sturbridge Village in Sturbridge, Massachusetts, have also developed hands on activities. These include arts and crafts such and learning to write with a quill pen and making tin candle holders (OSV.org, 2006). More about Sturbridge can be found in Appendix A.

 One study, conducted at the East Tennessee Discovery Center tested the difference in the amount of material learned in a hands-on exhibit verses the amount of material learned in an interactive media exhibit (Ayes, 1998). Interactive multimedia exhibits, while similar to hands-on exhibits, use computers and digital platforms to enhance the learning experience. Roberta Ayres (1998) concludes that since students are more interested with the illustrations and sounds of multimedia, they take the time to read the instructions and pay attention to what the exhibit is teaching. The students in the hands-on exhibit were more likely to simply play with the devices, such as pulling leavers instead of reading about the subject. Ayres (1998) suggests that multimedia is more rewarding and makes learning more enjoyable. The results can be staggering. One high school in Rhode Island implemented a multimedia-based curriculum to promote interactive learning. Within three years, the drop-out rate for the school decreased by 90 percent ("Multimedia for Everyone", 1993). Clearly, students will be able to benefit

academically from interactive learning techniques and many will also begin to enjoy learning.

2.1.2 Frilandsmuseet, Lyngby, Denmark

Frilandsmuseet is a branch of the Danish National Museum and is located outside of Copenhagen in Lyngby, Denmark. Frilandsmuseet was founded in 1897 by Bernhard Olsen and was originally located at the Rosenborg Gardens in Copenhagen. The museum was created with the intent of building a place where "total cultural immersion" was possible and focused on the "daily lives of ordinary people" (McMonagle, 2005, 4, Pedersen, 2002, 6). In 1901, the museum moved to nearby Lyngby and in 1920 became part of the Danish National Museum (Pedersen, 2002, 7-8). Over one hundred buildings, dating from the 17th century to the mid-20th century, compose the museum on nearly one hundred twenty acres of land area (Pedersen, 2002). The buildings are grouped by their origins and their surroundings mimic those of their original locations. Each feature of the museum is carefully maintained to keep the facts and feelings of the Danish history alive. Guided tours are available to visitors and tours focusing on specific topics, such as museum gardens, certain time periods or locations can also be requested. Self guided booklet tours can be purchased in the museum shop. The museum holds plays and includes living history actors to help to teach young students about Danish history.

Frilandsmuseet is a Living History Museum. This type of museum brings its visitors back to a particular region and time period and teaches the guests through exploration and conversations with the employees who act as "residents" of a particular era (Camensen, 2002), shown in Figure 1.

Figure 1: Living History Actors at Frilandsmuseet (Natmus.dk, 2006)

Today, most education in museums focuses on interaction between people and objects (Moore, 2002). Over the past few years, many museums have shifted their focus from simply displaying objects to becoming more technological based, filled with hands-on, interactive exhibits (AAM, 2005). Incorporating technology into museums makes the museum experience more exciting and fun for many museum patrons, specifically young adults who are not interested by traditional exhibits.

While Frilandsmuseet successfully targets young children and adults though its exhibits, it has difficultly capturing the interest of young adults. These visitors often become bored and quickly lose interest in the museum's resources. Developing specific exhibits, creating young advisory groups, holding after-school programs and incorporating forms of technology are all ways other museums have started to bring younger adult audiences into the museum (Rider & Illingworth, 1997). Frilandsmuseet is also taking a multifaceted approach.

Recently, the Nordic Handscape Project has adopted the broad goal of transforming all of Scandinavia into a museum. The aim is to allow people to gain access to information on any building or location in the Nordic countries through the use of a GPS mobile phone that tracks users and matches their position to data stored on a central

server. This gives users the power to guide their own tours (McMonagle, Schindler, 2005). Frilandsmuseet is home of the Danish pilot of this system and hopes to use this to their advantage in communicating with young adults.

Frilandsmuseet also aims to preserve and communicate the intangible feelings and moods of the past using their mobile phones. While Frilandsmuseet can easily preserve tangible history, such as buildings and works of art, it is difficult to portray cultural manifestations such as skills, knowledge, feelings, and moods. The goal of recognizing and preserving tangibles has been recognized on a global level and Frilandsmuseet, like all other museums, needs to find ways to preserve them. Researchers have warned that "oral cultural expressions such as oral traditions and literature, visual arts, music and performing arts" will quickly disappear if not addressed (Czermak, 2003).

The International Council of Museum (ICOM) has closely examined the idea of preserving intangible history. In 2004, the theme of ICOM's annual International Museum Day was "Museums and Intangible Heritage" (The International Council of Museums, 2006). At this event, many ideas of protecting intangible history were discussed which addressed the concern of losing important parts of cultural heritage. In an article written for the event, Giovanni Pinna (2003) wrote that museums can play an important role in the preserving of the intangible through transcriptions and recordings. The Musee de la civilization, a museum in Quebec, is an example of a museum that has strived to preserve history by creating a permanent exhibit that focuses on the Quebec's identity. The exhibit "Memories" uses specially chosen art work and objects to help the user trigger "nostalgic reminiscence, adaptive memory, repressed memory, imposed memory and spontaneous recollection" (Bergeron 2003).

Implementing a mobile phone tour which focuses on oral history and superstitions is one method that Frilandsmuseet can use to teach people about intangible history, while simultaneously capturing the interest of young adults. The technology at Frilandsmuseet includes mobile phones with a global positioning system (GPS) that can locate where the user is positioned and constantly update user's mobile phone data. The GPS at museum gives visitors the freedom to personalize tours and also allows visitors playing the game to see where they are in relation to other players and their surroundings.

GPS works by using a constellation of twenty seven Earth-orbiting satellites run by the United States military. A GPS receiver must find four of these satellites and calculate its distance from each before using three dimensional trilateration to pinpoint its location (Brain, 2006). For a detailed explanation of trilateration, see Appendix A.

2.2 The Museum Experience

Everything a visitor encounters on a museum trip composes the idea of the museum experience, but the idea does not end here. The goal of a museum is not to change patrons during visits but for these changes to carry on and positively enrich the lives of patrons long after they have left. The process of change itself is not limited to the actual visit since briefing and debriefing have been greatly facilitated, not only by activities than can be printed from the internet, but from other multimedia presentations and games that can be downloaded and experienced using the computer.

As technology's role in accomplishing museum goals becomes greater it is important to consider both the benefits and consequences of these changes. It is also important to develop methods of evaluation so that the effectiveness of each discrete addition or alteration may be considered within the context of what technology did before and what it may do in the future.

2.2.1 Social Goals & Outcomes

Personal transformations realized through the pursuit of lofty social goals are difficult to measure even if they are the priority of museums around the world. The acquisition of hard facts, on the other hand, is easy to measure and serves as a distraction for all those looking to objectively evaluate the museum experience. Between these two ends of the spectrum lies the social aspect of museums, the ability of two or more patrons to discuss their thoughts as they experience them.

The social aspect is one of the aspects that effects education in the museum and is highlighted by the interaction and ability of visitors to talk with one another about exhibits. Robert Semper, the Executive Associate Director of the Exploratorium, San Francisco, refers to the "social context" of museums and explains that because people

have different ages, background and experiences; they have different ideas on an exhibit and create a broader educational experience (Semper, 1990). According to Chiu (1997), students collaborating in groups can "draw on diverse individual experiences to exchange information, to understand different expressions of shared commonalities, and to construct new possibilities jointly."

In addition to directly intertwining hard facts and their social context through conversation, the social aspect of museums indirectly draws more patrons to the museum experience. This is illustrated through the emotional broadcaster theory of social sharing which proposes that "psychologically arousing stories will travel across social networks" (Harber, 2005, 382). One study was conducted in which several college students visited a nearby morgue. The conductors of the study recorded the number of friends that the students had relayed the story to, the number of friends that the friends had told, and the number of people the friends of the friends had told. The story had reached over 900 people in a period of 10 days. The explanation for the number of people can be justified by the idea that a visit to the morgue is an emotional experience (Harber, 2005). This model demonstrates how a museum exhibit that creates discussion amongst patrons will also draw new patrons in.

2.2.2 Tensions Surrounding New Technology

While there are many benefits of using technology to fill the audience gap, many tensions surround its use. While these tensions are presented as dichotomies, this is not necessarily the most effective way to handle these tensions when developing the game. This will be discussed later in the background.

The first of these tensions is the attempt to include both education and entertainment in exhibits. Museums want exhibits to be entertaining to their visitors, but also want to maintain the educational value of the exhibits. While some museum have started implementing simple games, some have gone have gone as far as applying rides as pedagogical tools, making the museum similar to theme parks. The popularity of these theme park type museums is rising due to their ability to make learning fun and target the younger audience. For example, the Jorvik Viking Museum in York, England allows visitor to go on an archaeological adventure though York 1000 years ago and to get close

to the Vikings via a cart that guides the visitor through the museum (Jorvik Viking Center, 2006). This museum has many aspects of a theme park, and while the thrill is important to grab the visitor's attention, it is crucial to keep the educational balance of the museum. Education can be implemented tactfully into the amusement park setting, but the question still remains; how far a museum can go before it becomes a theme park?

Another major tension that arises from implementing technology in exhibits is the issue of linearity. If not carefully used, technology can force users to learn in one particular way, instead of letting them learn for themselves. A good exhibit allows the user to use the exhibit in the way that is most useful to them (Semper, 1990). One of the first appearances of this problem occurred when museums began to integrate guided tours via portable cassette players for the use of visitors. Unlike the traditional museum setting in which visitors were free to experience the museum independently, visitors were now guided along a dictated tour (Proctor, 2003, 2). Part of the appeal of museums is allowing guests to learn at their own pace and explore exhibits freely (Ayres, 1998). This idea is supported by Kim (1999) who links an increase in learner inference to an increase in "interestingness" and by Gilabert (2005) who links an increase in learner inference to an increase in recall. Technology in museums has made significant advances over the past forty years. This began with the introduction of audio media to be used as tour guides by museum visitors. Originally using a reel-to-reel system, the format of the portable audio guides made two major technological changes in the first 35 years of their existence (Proctor, 2003, 2).

In 1980, the compact cassette was introduced as a new media for which audio guides could used, greatly reducing the size of the players making it easier for patrons to maneuver throughout the museum. Fifteen years later, the players made the transition from analog to digital, a much more substantial change then the previous one. These new digital players allowed museums to provide an almost unlimited supply of audio, with multiple languages and custom tours on different tracks. The digital players also gave guests the chance to roam freely throughout the museum and experience exhibits as they pleased (Proctor, 2003, 2).

Currently, most major museums have integrated digital audio into their infrastructure with many including the guides in the price, giving "the impression of a

valuable, free education service (Proctor, 2003, 2)." Types of digital players that are offered include MP3 players, wands, headset devices, radio systems, and PDA's. MP3 players have the ability to "track and download visitor usage patterns, respond to visitor queries, carry multiple languages, provide linear and random access tours, and synch multi-lingual sound tracks to films and videos (Proctor, 2003, 3)." Museum professionals debate whether the headset or wand is better suited to enhance the overall museum experience. Proponents of wands argue that headsets create the potential of negatively affecting the "social aspect" of the museum visit (Proctor, 2003, 3). However, with an increase in the technology toward screen-based players, the head-set solution will provide the means of audio playback (Proctor, 2003, 3).

Tensions also emerge from the interaction between humans and technology. The balance between digital and human resources will need to be thought about and evaluated. As the role of technology becomes larger, the role for humans becomes smaller. In effort to avoid this tension, we want to optimize the roles of digital and human resources. As technology advances, one should view the time of humans as being freed up for work better suited to their superior abilities.

The positive aspects of giving this tension consideration are especially visible at Frilandsmuseet, which features living history exhibits. Because actors provide the visitors with additional information to the exhibits, we must avoid having the technology provide the same information. Using the game, it may be possible to have the technology and human actors work together. Tom Kelleher, a curator for Sturbridge village, a living history museum located in Sturbridge MA, likes the idea of using an interactive game to encourage the visitors to ask questions to the human actors. In an interview with Mr. Kelleher (2006), he mentioned that visitors are often overwhelmed when coming to the museum and ask simple, quantitative questions to the actors to avoid sounding unintelligent. He suggested that if the game could provide visitors with conversation starters to help them ask qualitative questions, their trip to the museum could be greatly enhanced. A summary of Tom Kelleher's interview is shown in Appendix B.

A similar tension is that the technology needs to be easy to use and not be forced on those who do not want it. The technological advances of museums may not phase younger generations, but it presents a particularly pressing problem for older ones. The

older generations are continuously bombarded with new contraptions which may take away from their idea of the museum experience. Assuming the monotonic and exponential growth of technology, even young people can expect to feel this tension as they grow older since the problem goes beyond simple ergonomics. Detailed instructions will bore younger generations yet vague instructions will confuse the older ones. In either case there is potential for confusing one's museum experience and unfortunately there is not am ideal solution that suits both parties.

Several studies have been conducted in order to highlight the effect of implementing technology into museums. One study, performed by Hewlett-Packard Laboratories at the Exploratorium in San Francisco, attempted to determine ways of enhancing visitors' trips to the museum. In particular, the study wanted to "understand the strength and limitations of nomadic computing technologies while enhancing the visitor's experiences" (Fleck, 2002, 1).

An electronic guidebook with nomadic technology on a PDA was introduced to several groups of visitors to observe their reactions. The guidebook provided the visitor with additional information about the exhibits they visited and featured a "remembering" concept that tracked the guests travel throughout the museum, allowing them to access additional information on topics upon finishing their tour within the museum. (Fleck, 2002). The team conducting the study found that the guidebook was an overall success and that people liked the idea of using technology to access extra information on exhibits. However, the users complained that they did not have enough hands to simultaneously use the PDA and the exhibit, arguing that the PDA was too complicated requiring lots attention (Fleck, 2002).

It is important to keep in mind the results of this study and all of the other tensions when designing the game for Frilandsmuseet so that technology does not take away from the effect of the museum.

2.3 Exhibit Design

Many aspects contribute to creating a successful exhibit. Exhibits must be enjoyable, while providing the user with a valuable learning experience while considering

the previous tensions. Success of an exhibit will directly affect the museum experience of visitors. While Frilandsmuseet requested a game to be designed and implemented on the mobile phones, the team feels that an interactive tour is a more appropriate way to describe the solution. A tour provides an interactive experience that entertains and teaches but does not give the user the illusion of actually playing a game in which a player can win or complete a task. The tour, however, was written as if it was a game, including thinking about game genres and following the game development process.

Three game genres that lend themselves to our work at Frilandsmuseet in Lyngby are role-playing, action/adventure, and puzzle games. Although independent of one another, these three genres are not necessarily mutually exclusive. This allows us to incorporate elements of both genres into our game.

2.3.1 Role-playing

The role-playing genre has occupied hobbyists for many years, inspiring such famous titles as *Dungeons & Dragons*[1] and *Vampire: the Masquerade*[2] (Role-playing game: prominent titles, 2006). Most recently, research has begun to accumulate on the educational benefits of role-playing within both traditional academic settings and practical training environments.

Over the last decade, research at Worcester Polytechnic Institute has explored the applications of role-playing within the traditional academic setting at length. Studies focused on how role-playing might be used to establish equity between cognitive learning styles of different students where traditional academics had failed (Spino, 2002). The styles of learning in question were originally pioneered by Katharine Cook Briggs and her daughter Isabelle Briggs Myers during World War II when they distinguished between intuitive and sensing learners based on the work of psychologist Carl Jung (Myers, et. al., 1998). Within the scope of higher education, these intuitive learners use their abilities to figure out the system, allowing them to excel within tradition academia whereas over half of their sensing counterparts end up in the lowest quartile of grades (Spino, 2002). Ellis (2003) later commented on this saying that,

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[1] © 1995-2006 Wizards of the Coast, Inc., a subsidiary of Hasbro, Inc. All Rights Reserved.

[2] © 1998 White Wolf Publishing, Inc. White Wolf Game Studio.

"Aside from being a novel way to learn, role-playing exercises have been shown to be a more effective method of teaching for some students who might otherwise be unable to perform at the level of their peers."

This theory that role-playing evens the playing field for sensing students was confirmed by Cooper in 2003 and again by Gagnon in 2005, who showed that role-playing games increase the performance of the entire class even after creating equal opportunities for both learning types. In his study of a game where students role-played the delegations from different Middle-Eastern countries during a mock UNESCO Conference, Gagnon (2005) commented that,

"We think they also retain it better because they saw how it was useful and it is tied to a vivid memory or experience. The material is no longer abstract and linear, but multilevel, textured, concrete, and personal."

Role-playing enhances the museum experience by fostering communication among players which in turn enriches the amount of information acquired; however, role-playing games also have their difficulties. Kate Salen (2004) states in Rules of Play, "you move through game-stories, following the rules, overcoming obstacles, accomplishing tasks, and generally increasing the abilities of your character. What is usually lacking, however, is a single endpoint to the game. Role-playing games are structured like serial narratives that grow and evolve from session to session." This identifies an issue we will need to address while developing the game.

2.3.2 Action/Adventure

The action/adventure genre is generally connoted by players being led around through the game in search of an item or person only to receive a similar objective after finding their original target. A comparable scenario within the genre is the scavenger hunt where players are given a list of objects they must retrieve. Given the mobile phones' capabilities, players could be instructed to take pictures of items and locations and to

record certain sounds. These tasks are often accompanied by some form of time limit. Common to both the action/adventure and puzzle genres, time pressure is useful for creating excitement and a sense of urgency amongst players.

Technology is currently being implemented in many games. Although technology is not always required, it can enhance the user experience when used properly. Technology can provide students with additional information, encourage players to track their progress, and allow users see where they are positioned relative to other players (Ellis, 2003).

The MIT Teacher Education Program has been working together with The Education Arcade over the last three years to create augmented reality games that enrich real-world experiences with virtual information supplied by portable handheld devices (MIT Handheld Augmented Reality Simulations, 2005). For a detailed explanation of augmented reality, see Appendix E. Both indoor games using wireless networking (Wi-Fi) and outdoor games using global positioning system (GPS) technology have been piloted. Software is even being developed that allows users to program their own "AR" experience.

"Mystery at the Museum" is one example of an indoor game that challenges students to find clues and catch a museum thief. The students must interview virtual characters and analyze information using virtual instruments. "Environmental Detectives," is an outdoor game that uses a GPS to track the location of the students. In this game, students investigate contaminated drinking water and determine where it is coming from (MIT Handheld Augmented Reality Simulations, 2005). Figure 4 shows the use of a PDA device in one of the AR games. Additional information on AR games is listed in Appendix A.

Figure 2: PDA in AR game designed at MIT (MIT Handheld Augmented Reality Simulations 2005).

Eric Klopfer, a professor at the Massachusetts Institute of Technology (MIT), is an expert on creating augmented-reality games. In a phone interview with Mr. Klopfer (2006), he emphasized that two players per phone was ideal and that more players could become problematic. Two players per phone seems to maximize collaboration within the group. Additional players can inhibit the learning experience because extra group members may become bored. He suggests providing no individual group with all of the information required to complete the game in order to promote collaboration between groups. This forces the groups to work together and to learn from each other to complete the game. Mr. Klopfer stresses the need to keep information flowing and that the game world needs to stay connected. We will need to consider how the game will achieve this. Finally, Mr. Klopfer recommends a "sandbox" run of the game, a mini version that linearly guides the user through all of the game features. After the "sandbox" run is completed, the user is then free to use the phones however they wish.

2.4 Game Development Process

The development of the tour follows an iterative process similar to the one used in the development of games. The design process requires many iterations as different ideas are thought about, implemented, and analyzed. This process is illustrated in Figure 3. Once ideas are brainstormed, they are further enhanced, tested and evaluated. When problems occur, they are the reconsidered, fixed and then tested (Fullerton, 2004).
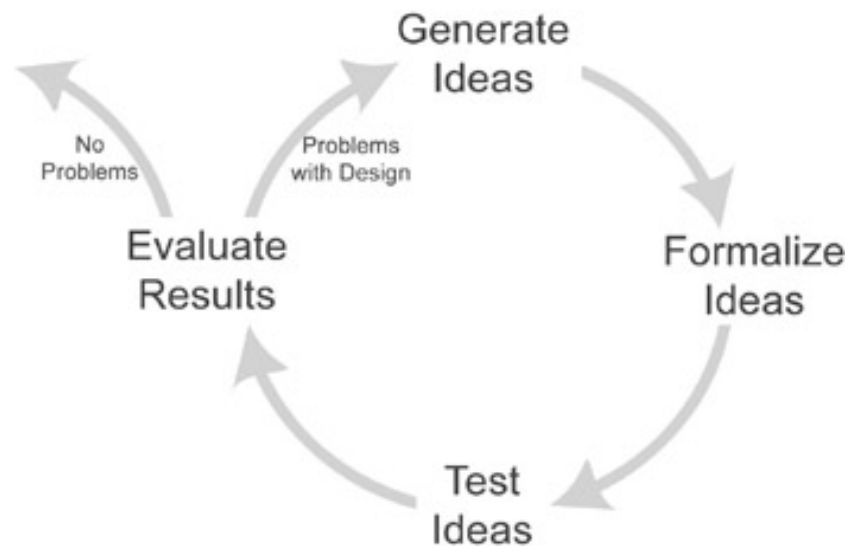
Figure 3: Iterative process diagram (Fullerton, 10, 2004).

The tour began as the idea of an augmented reality role-playing experience. What began as a game became a tour within the context of the technical limitations of the mobile phones and throughout many cycles of the game development process. The driving force behind any game is to have fun and this fun is generally generated through the actions and decisions of players. Since the functionality of the mobile phones is limited to tracking players, the idea of a game shifted to that of a tour created in the spirit of games and their style of fun.

Chapter 3: Methodology

This project explores the dialogue between the Danish National Museum and its audience by using the museum's combined use of newly incorporated technologies and its open-air grounds in Lyngby as interaction tools, and aims to further expand the museum's repertoire of design techniques to include elements of storytelling and intangible history to help the museum target the young adult audience through the development of a self-guided tour.

In order to complete the goal of the project, we pursue the following objectives:

- Identifying an audience for the tour
- Establishing the role of the tour
- Bounding the tour within the limitations of the current technology

The diagram in Figure 5 illustrates the balance among the objectives and how they are used to create the final tour deliverable.
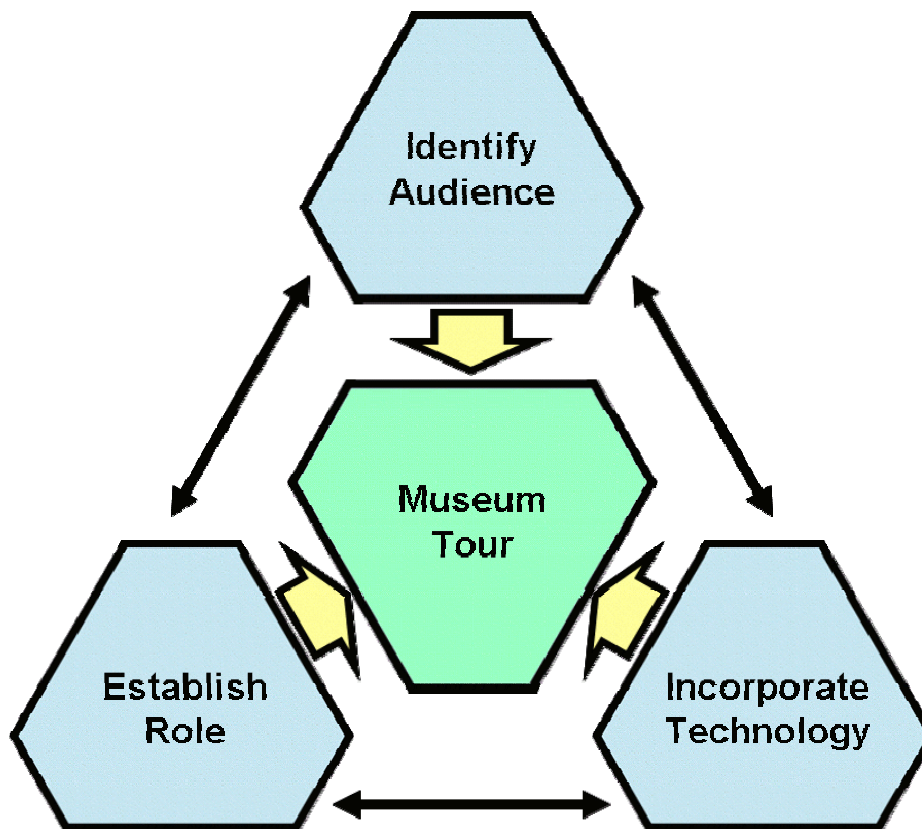

Figure 5: Methodology Chart

Although the project began with the goal of testing the completed tour implemented on the mobile phones, we found that we would not be able to complete testing due to unfinished upgrades to the technology. Instead, the emphasis of the project shifted to the development and construction of the tour. This shift allows us to focus on evaluating the tour script and concept and also helps us spotlight the incorporation of oral history and intangible aspects of the museum into the tour. Success criteria for determining the effectiveness of the tour are provided to the museum for future use.

The project runs from March 13, 2006 to May 10, 2006. Following its completion we will follow up with the museum professionals who aided us in our background research. Based on our suggestions, the Danish National Museum will continue working with the Nordic Handscape Project to incorporate the tour onto the platform and continue to add new technologies in to their exhibit designs.

3.1 Identifying an audience for the tour

Identifying the audience of the museum and determining what gaps exist in the audience are vital to the development and success of the tour. While the museum has many visitors, some age groups visit the museum less frequently since the museum has little to offer them. Once this missing audience is recognized, a tour can be created which targets them and draws them into the museum. Identifying an audience for the tour is accomplished through the following methods:

- Examining the museum audience
- Interviewing museum stakeholders

Before constructing the tour, observations of the museum audience are made in order to determine what age groups quickly exhaust the museum's exhibits. It is necessary that the group establishes a target audience so that the tour helps us to change the museum experience for those who do not currently enjoy it. Through the observations and interviews with project liaisons, the target audience is determined. Klaus Jensen, an IT professional for the museum, and Rikke Ruhe, a museum creator are interviewed in order helped us recognize an appropriate target audience. The interviews are both open-ended and structured, allowing our interviewees the freedom to take the conversation

where they please while being guided with an outline of questions. This method is effective for acquiring information on the needs of the museum while letting our interviewees broaden our thinking (University of Hertfordshire, 2000).

The museum is particularly interested in making itself more appealing to visitors who become uninterested with the exhibits and fail to learn much of the history which is preserved on the grounds. In particular, the museum wants to target young adults between the ages 14 to 25 year olds. A main goal of the tour is to change the current situation and allow this age group of visitors to "see the museum with new eyes" and for audiences to be entertained by the tour (Ruhe, 2006).

3.2 Establishing the role of the tour

The next task for the project is to establish the role of the tour. This process occurs through the following steps:

- Brainstorming concept for the tour
- Establishing museum resources and goals
- Creating a storyline and script to communicate intangible history
- Evaluating the tour script and concept

Upon establishing a target audience, the group is able to brainstorm several tour concepts directed at the target audience. The possibilities are discussed with the museum stakeholders to help establish a single overall theme for the tour.

Through interviewing the project liaisons, the resources of the museum, such as the land, exhibits and technology, are discussed in order to determine their limits and to create best ways to effectively use all of the museum's assets within the tour. The grounds are toured to assess the layout of the museum and to gain a feel for the museum exhibits. Since the museum was closed until April 8th, 2006, it was not possible to initially observe guests touring the museum; instead we walked throughout the museum on our own to mimic how we thought visitors may explore the museum.

Discussions with museum curator Rikke Ruhe provide the team with essential oral history to be included in the tour. Knowledge about the history of several exhibits is obtained and information about the intangible history that exists within several of the

buildings is acquired. The oral history includes information on superstitions and the role of social status in the early 1800's. Conversations with project liaisons also make it clear that historical fiction can be used to create an interesting story that involves the oral history.

Fictional storytelling tied together intangible history is used to create the idea of the tour to educate visitors about the superstitions of the 19th century. The versatility of the current technology allows for implementing such a tour, as it can virtually place users in a scenario similar to one the designer desires. In theory, patrons of the tour are to learn through experience as opposed to reading paragraphs of text about each exhibit.

Conversations and brainstorming within the team leads to the creation of a plot for the tour. Drawing on the oral history and combining it with fiction, a script is written and characters are designed to fit the roles of possible characters from the time period. The script is shown in Appendix C. Within the script, intangible knowledge is embedded so that a person who experiences the tour gains a solid idea of the oral history of the time period. Points of interest (POIs) are identified as places where a visitor taking the tour meets a character. Sound clips of character's dialogue on the mobile phones are used talk to the user and to direct them to additional POIs where they stumble upon clues about the outcome of the tour. The dialogue of the tour is a script written in colloquial English.

Discussions with museum employees are held to help us evaluate the concept of the tour and dialogue of the script to determine if they believe the game effectively transmits intangible ideas and is appropriate for the target age group. The script is changed to incorporate suggestions.

3.3 Bounding the tour within the limitations of the current technology

The final task of the project is to bound the tour within the limitations of the current technology. This is accomplished through the following methods:

- Assessing the current state of the technology
- Creating media to augment storyline
- Implementing the tour onto the system

At the museum the phones and GPS connection are played with in order to quickly figure out their possible problems and limitations. The phones are used to travel around the museum to gain a feel of their potential to help broaden the museum experience.

An important part of creating the tour is taking full advantage of the current technology by using all of its possible features to enhance the tour, including sound clips and pictures. The script is translated into Danish and is slightly altered to make the colloquial English into colloquial Danish. The sound clips for the tour are recorded at the National Museum's sound studio in Copenhagen. Actors and museum employees are used to portray the voices of characters. Pictures previously taken by the museum are selected for each POI and used to show how individuals dressed in the early 1800s.

Installation of the game is completed through an online interface which communicates with a central server that sends information to the phones. Upon acquiring the necessary media, each of the POIs are created on the server and the pictures and sound clips are uploaded. To turn the tour into a playable state, a person loads the LifePilot application and performs a search for the specific POIs associated with the tour. This way, only POIs specific to the game appear on the screen. Once completed, the user activates the GuideMe feature and connects to GPS. The tour is now ready to be used. Once a user travels within the proximity of a particular POI, the information pertaining to that location appears on the phone and the sound clips and pictures are loaded.

Chapter 4: Analysis

While analyzing the tour and its contribution to the museum, we found that it was important to begin with the museum audience. Without the audience, the museum has no reason to exist. All age groups within the audience need to be considered so that museums can build a diverse audience which continues to visit the museum. It is essential that we evaluate the audience to determine the age gaps and create a target audience for the tour.

Since the tour is reliant on technology, it is also important to analyze the technical aspects of the mobile phone and platform in order to determine what is available for use so that we quickly determine the phone's limits allowing us to work around them.

Possible problems of the tour and the decisions we made during the construction of the tour are both carefully thought about during the project helping to create the best possible tour. Solutions to the problems were incorporated to minimize their effects. From our analysis it is clear why we made specific decisions and why certain themes, plots and characters were used.

In addition the analysis shows how the team handled tensions discussed in the background section and shows that the dichotomies of the tensions can be used to create a successful tour.

4.1 Audience

Frilandsmuseet receives thousands of visitors each year. Even on a very dreary opening weekend during the second weekend in April, the museum welcomed over a thousand excited people. Visitors include many classes of young students, families, dog walkers, artists and buses filled with tourists. People looking for a place to walk or go for a picnic are also found touring the museum on a daily basis. The surrounding community looks forward to the opening of the museum since it serves as a meeting place for friends and families.

The interests of museum audiences are generally more diverse than simple concrete facts, but this is even more the case at Frilandsmuseet. As there is a very limited

amount of text on the exhibits, people tend to learn primarily from exploring the buildings and landscape. Visitors come with an agenda of their favorite things to look at, for instance, the gardens, houses or animals.

The museum grounds include over 100 buildings that are spread across 120 acres of land. Buildings include manors, farms, cottages, poorhouses and windmills. Visitors do a large amount of walking during their trip in order to see all of the sites. Because the buildings are grouped by time period, origins, and social status, some visitors choose to remain in a smaller area that intrigues them most.

The museum targets visitors and draws them into the museum with several activities including the use of costumed actors, plays, and a variety of the tours. While this repertoire of activities is adequate in reaching a large majority of visitors, specifically younger students under age fourteen and adults over the age of twenty five, a gap exists between addressing young adults and a variety of other visitors who quickly exhaust the museums resources and become bored. The museum desires a way for these patrons to see the museum through new eyes, a method for interrupting this audience's current thinking about the museum, and a way to subject these visitors to new ideas. (Ruhe, 2006).

A scavenger hunt where visitors search for sights and sounds around the grounds addresses this issue with a minimal yet predictable amount of success. A shift toward intangible material transmitted implicitly also addresses this issue of audience by presenting information that is not directly connected to any history or cultural heritage but encourages visitors to think about their environment and helps them begin to "accidentally" think about culture and heritage on their own.

While the project aims to eventually target all patrons of Frilandsmuseet, the initial audience of the game is young adults who need a new way to experience the museum since they quickly become bored. Classes of older students have been observed to quickly walk through the museum and then spend the rest of their time inside eating lunch. The tour is one way to encourage them to spend more time outside, helping them to experience everything the museum has to offer. Additionally, the younger audience can easily walk to several spread out distances around the museum and will be more attracted by the technology of the mobile phone.

4.2 Technical

The tour is implemented on Nokia mobile phones which use the LifePilot platform to connect to the GPS receiver, allowing the user to view maps of any location within the Nordic countries. The project team examined the mobile phones and the platform in order to obtain a better idea of their capabilities.

The tour is observed using the MobileGuide application within the LifePilot platform. MobileGuide displays a digital map of the museum and small icons appear at locations where information is available to be viewed. Three pages of text, five pictures, and thirty seconds of sound are accessible to be inspected at each location. While viewing information at a POI, the text always appears first. In order to view media, one must select the appropriate tab on the screen. The user can choose to use the GuideMe feature which tracks the user's journey around the museum, automatically displays information when the user comes within 20 meters of a point of interest (POI), and uploads new maps when the user travels to an area out of the current map's range. Another application, Tematur (Themed Tour), is more suitable for our tour as it only displays media and ignores the text. Currently, Tematur is in a development stage and does not have the functionality to display pictures and play audio. However, our tour is likely to run on this application in the future.

By observing the mobile platform and experimenting with loading data, we determined that when used to its full potential, the current functionality of the platform lends itself to a mediocre game. This is due to the software's inadequate ability to cascade events. Cascading events is the capacity of a game to progress the storyline as certain events occur in real time. While the phone does not have this functionality, one ability currently implemented on the phones is that of making certain POIs available only after a set period of time has elapsed. A more valuable ability not currently implemented on the phones is making new information available after a particular POI has been visited. The technology of the phone and platform also limits the game to having fixed information at each POI, eliminating competition and interactivity in the game. As opposed to ideas discussed in our background, information can not be divided between

the phones which removes the possibility of having teams to work together to solve the game problem. Because many aspects of a typical game, such as competition and interactivity between players, are not available due to limits of technology, the game is presented as a self-guided tour. The GuideMe feature in the phone is thus used to have information pertaining to the POIs automatically appear when the player gets close to a POI throughout the tour.

The main issues we encountered with the phone functionality are software bugs and a poor GPS connection. Since the GPS receiver loses connection and requires reconnection when the player goes inside, the game is limited to outdoors. The GPS receiver must also be held flat to maintain a stable connection, a possible annoyance to the user. A device which facilitates holding the phone and GPS device may eventually be a useful addition. Because the phone functionality problems cannot be directly addressed by the project, directions with comprehensive steps and photos are used to facilitate the use of technology. An example of these instructions is shown in Appendix E.

A mock test performed on two museum employees showed unexpected technical problems in the game. Not only did the text quickly vanish from the screen and could not be reopened, but several of the POIs opened at the wrong time due to the radial distance being incorrectly set. It was also observed that the mobile phone screen constantly went black to save power, causing frustration to the user who needed to keep pressing buttons to reopen the LifePilot platform.

4.3 Using Technology to Entertain

Technology is particularly attractive to the museum because of its potential to tremendously boost the entertainment and excitement of the museum's current tools without making many fundamental changes to the physical museum itself. However, it is important to remember that this ability of technology to invisibly layer itself upon already existing exhibits becomes a great weakness when ignored.

Technology that fails to hide itself amongst the objects it is meant to enhance can easily become a frustration to those uncomfortable in technologically cluttered

environments. Therefore, in order to implement technology successfully, it must be incorporated where it can not be noticed.

By introducing technology to the museum, the museum must be careful to balance the education of history and entertainment of the phones. Conversations with museum stakeholders make it clear that the entertainment is a very important aspect of the game. While the museum stakeholders greatly value the role of education in the museum, their goal of this project is to enhance the patron's enjoyment of visiting the museum. The museum does not want the tour to explicitly tell students facts about exhibits. Instead they wanted the students to learn through experiencing daily life of 200 years ago. The museum also hopes that the technology involved in the game will interest a large portion of the audience.

4.4 Possible Problems with the Self Guided Tour

The primary limitations of the project are the time, the technology, the exhibits, and the players. The concept of the tour emerges from the interaction of these four variables. Historical fiction and storytelling allow us to intertwine these four variables by creating a scenario that was likely to occur in the time period, but use characters that never existed. Using historical fiction enables us to create a tour that is appealing to the audience and facilitates in the writing of the story which includes intangible history. The tour, however, has many possible problems which script needs to address; the main problem is creating a motivation for the target audience. One way to solve this problem is to introduce a competition element into the tour, such as establishing a time constraint or rewarding players for correctly solving a problem. Another solution is to create obstacles which encourage patrons to work in teams. This could be achieved by distributing partial information among the phones such that players must consult other groups to obtain the information needed to complete the tour. However, as already discussed, this is not a feasible solution due to the constraints of the technology.

Lack of enjoyment may also be caused by the large distances between the POIs. Since the museum covers 126 acres of land, the clues of the tour will be very spread out. Users may become tired and lose interest in the tour. Bad weather may limit the amount

of walking the user is willing to do. In order to minimize this problem, we will restrict the tour to a small area of the museum.

The presentation of our tour will be important to its success. We have written a realistic story and script that subjects the players to the mindset of the 1800s. The plot maintains a consistent flow and does not include unexplainable gaps.

Allowing the audience to see the museum with new eyes and helping them to experience life in the early 1800s is the goal of the tour. To achieve this, the intangible feelings of the period must be addressed. Intangible history includes superstitions and social status, things which can not be understood effectively through the readings of text books or a simple walk through of the museum's exhibits. The tour places users in an environment where they can become familiar with the nuances of the time period. Superstitions were widely accepted as valid conclusions to certain situations. A three-legged black dog told the coming of death, people who spent time with elves were looked upon negatively, and the stream man is ready to capture anyone in the vicinity of the water. Users may find it more believable to use some superstitions to explain the outcome of the tour. These mysterious beings are all included in the script, shown in Appendix C. The dark woods and lonely road located at the museum are used as perfect locations for these ideas to dwell.

The tour also highlights variation among classes. In addition to the class differences seen by visiting the houses, diction and dialogue of the characters depict their monetary status. Users learn about status from the content of characters' message and by the way in which they speak. A user who visits each of the POIs will have a clear perception of how the social networks of a similar village in the 1800s might have existed. There is a large amount of room for the expansion of this dimension of the tour in future versions.

4.5 Constructing the Self Guided Tour as a Story

Based on the problems discussed, several tour decisions were made regarding the story line. Each decision was carefully thought about in order to make a tour that best fit the needs of the museum and helped the audience to look at the museum with new eyes.

Themes and motifs, plot, characters and how the game is played through linear and nonlinear features are important to discuss so that the museum can later use our ideas to make the tour longer and more complex. The script is used to transmit themes, plots and characters to the user.

The purpose of any theme included in the tour is to aid the museum in transmitting the intangible heritage of its collections. The many sights, sounds, and smells of the museum give patrons an idea of how their ancestors lived. The subtle essences of life in a different time, including the way people thought and felt and how they loved and feared, is crafted and presented in a particular manner.

In particular, the goal of the tour's design is to intertwine many different themes together. These themes include ones that are alive and prevalent today, such as wealth and power, and others that are also around, but whose role has transformed over time, such as superstition and myth. The combination of these themes helps to upset each patron's assumptions of what is normal and safe and to grant them access to perspectives which may have been otherwise unavailable in their previous experiences.

The tour's story can be learned in a way that is not dependent on the number or order patrons experience the POIs, so in essence the tour is designed to tell many perspectives of the same story that all express common themes and motifs.

In order to enhance user's enjoyment, while still providing a learning aspect to the game, the game focuses on exciting themes including disappearance, possible murder, and superstition. These themes target the audience, stimulating them to learn about the dangers of everyday life. Historically correct fiction is used in order to create an interesting plot line that is intriguing to patrons. The story includes possible scenarios that could have occurred in the 1800's. People worried about being taken away by the stream man to his murky home in the water and believed in the bad omen of seeing a three-legged dog. Through combining these stories and themes, an exciting game is created which not only provides a learning experience, but enhances the entertainment of the museum.

Emerging from these themes is the plot of the tour. The plot of this story follows the disappearance of a local clog-maker. Disappearance used as a device coupled with the decision to leave the story without a defined ending makes all conclusions about the story

more plausible. Special care is taken at every step to avoid details that allow patrons to explicitly rule out fantastic explanations like elves and stream men, while there exist more logical explanations, something for patrons to discuss amongst themselves.

The design of the complete tour includes story information at all existing POIs around the museum. Every person and every detail is an important part of the complete story of what is happening in the village. This way, patrons will always find something new to discuss even if they do not decide to follow leads that they come across.

Because the POIs in the pilot tour are spread out, characters from the script give directions to other POIs that patrons can get information at. This is an important element in the final tour because it fosters the notion that patrons are accomplishing something as they visit each POI. Although POIs are designed to be experienced independent of order, providing patrons a reason and a direction makes the experience more concrete. A danger of the pilot tour is that patrons will not be able to follow the directions, leading to frustration and wanting to give up on the tour. The final tour should be free of this problem since getting lost can lead to new information that patrons may not have found otherwise. POIs are not clustered together, removing the need for directions all together.

Similarly, the ability to add digital pathways is available, but not implemented in the tour. The pilot tour may have benefited from such functionality, especially in the case of less tech-savvy patrons and those less adept at following directions. However, the full version of the tour will include more POIs, greatly reducing the importance of successfully following directions given by characters during the tour and further reflecting the tour's focus on exploring the grounds in a nonlinear, non-guided fashion.

Although patrons are free to spend any amount of time on the tour as they please, a suggested time of one hour and distance of 2.4 kilometers is given in the tour's introduction to provide patrons with an estimate of the duration and length of the experience. This amount of time lets the user hear and formulate conclusions about the story. Even outside of addressing the actual story, it is essential to avoid language that suggests that patrons are experiencing the tour incorrectly.

Characters from the script are used to bring the players into the plot of the story. During the tour, the characters talk directly to the players, suggesting them to go to various places. This helps the players feel as if they are actually part of the early 1800s.

Since the number of characters is limited by the number of POIs, each character is treated as its own vehicle into another perspective. Script writers and translators must develop clear character concepts so that each has its own personality. If all characters sound the same, then all other steps lose their intended functionality.

Unlike books where readers are free to bond with characters at their leisure, patrons experiencing the museum's story will have their time limited to only one or two hours. Because of this, audio clips are used in place of text so patrons can immediately feel the emotions layered throughout the script dictated by tone and diction.

Photos are paired with each audio clip to provide patrons with images of period clothing to enrich their constructions of the world presented to them. In future versions, cartoons of the characters may be used in place of photos to leave something to the imagination of the patrons.

Klaus is the only character who is not depicted directly through pictures or audio. Since he is the only constant character throughout the story, most patrons should be able to develop a clear image of him. This atmosphere of mystery is crafted to create material for patrons to discuss even after they have completed their experience and left the museum.

Each of the characters instructs the player to go to different POIs; however it is then up to the player to decide which POIs they want to visit. Allowing users to choose where they want to go brings a nonlinear aspect into the tour. Although the player is urged along one path in the tour, many others are possible. The player is told to begin at Klaus, the clog maker's, house, to determine what happened and where they are supposed to go. Klaus' wife hints to the player that Klaus went to drop off clogs at Søren's house while Klaus' daughter, Trina, hints that Klaus may have gone to visit her friends at the poor house. The player can choose to travel to Søren's house or the poor house in either order, or chose to only go to one. Both POIs suggest to the user to walk dawn the lonely road, passed the woods to the Steward's Manor. The player will most likely travel through the woods, over the bridge to the Steward's manor, and finally to the end of the game. However, if the player skips a POI, the game can still be completed. Essentially, the player can journey through the game as they please picking up pieces of the story until it is complete. Because of the construction of the game, the player can choose the

order and number of POIs they visit. This nonlinear functionality lets the player learn and solve the puzzle in the way that is best suited for them.

Another nonlinear aspect of the tour is that it lets players determine their own meaning of the clues, allowing them to make inferences about the storyline and helping to place them within the tour scenario. Each player's interpretation of the story helps spark conversation among players, creating open-endedness and continuing the tour experience after it is completed.

Some players may feel that Klaus is a mischievous man since he "stumbles" around the woods and "dances with elves." Other signs that may lead players to think this include that Klaus is "always getting himself into trouble" and that he may be cheating money from Søren. Other players may believe that Klaus is a well liked man, since he gives shoes to poor kids and is greatly loved by his daughter.

Many deductions can also be made about Old Lady Hagrid. She may or may not be crazy. She tells many stories which the player can decide to believe. The loss of her daughter who drowned in the stream may have caused her jumbled stories. One possibility is that Old Lady Hagrid became pregnant out of wedlock and then drowned her child after birth.

The player can make assumptions about what happened to Klaus. From the conclusion of the game, it is uncertain what actually happened. One possibility is that Klaus stumbled drunkenly into the stream. Another, clued by the "strange noises" heard by the farm hand, is that he was murdered. Perhaps the elves were bandits that Klaus knew killed him. Maybe Klaus was taken by the stream man. It is up to the player to decide.

The game is designed in this way to allow the user to be creative and conjecture as many different story lines as possible. The more ideas users can think of, the more we have succeeded in widening their perception.

As its name suggests, a unique attribute of Frilandsmuseet is its open nature. Dirt roads meander throughout the museum grounds allowing patrons to wander freely and choose how they want to communicate with the museum collection and staff. This is similar to the tour where users can guide themselves throughout the POIs in any way they please. Furthermore, when paired with certain technological advances, such as the GPS

mobile phones featured in this project, these same paths, both literal and figurative, can be re-explored by patrons allowing them to see their museum through new eyes.

4.6 Future Implemented Tour Evaluation

Since the current technology does not allow us to perform a successful test on the tour implemented on the mobile phone, future testing performed by the museum is necessary in order to determine if the tour is effective at capturing the attention of young adults and successfully helping users experience intangible history. Semi-structured interviews are an effective way to encourage the players to talk about their likes and dislikes of the tour.

It is important evaluate the tour on a number of success criteria including the social aspect of the tour and the enthusiasm of the players. The social aspect is the ability of the tour to foster conversations between the players during and after the competition of the tour. This is important because the museum experience does not only happen during the trip through the museum, but also before and after. If the tour is successful at generating conversation, it is thus adding to the museum experience and helping people learn from others about what they thought was interesting in the tour. Similarly it is important to determine the amount of enthusiasm of players. The more they enjoy using the tour, the more they will want to return to the museum and use the tour again.

Chapter 5: Conclusions

After analyzing each of the components of the project, we are able to draw several conclusions and make recommendations to the museum. It is necessary to draw conclusions from the mobile phone technology, museum audience, and tour script so that we can help the museum enhance the overall experience of the visitors and maximize the use of the tour.

From completing this project, it became very obvious that the technology of the mobile phone and LifePilot platform is the major limiting factor of the tour. This is because the combination of the phone and the platform is extremely difficult to use, and consequently it is very hard to teach a user how to work it. The platform requires a person to not only connect to the GPS and start the GuideMe feature, but also load individual sound clips and pictures at each POI. This calls for a large amount of patience since it can take up to thirty seconds for each piece of data to load. The function of the buttons also appears to randomly change. For example, while sometimes the right arrow button will scroll through the text, other times you need to press the down arrow button instead. Additionally while using the GuideMe feature and the GPS simultaneously the sound clips do not play, and without GuideMe, the sound clips do not always load. Users would not want to use the phone as a tour guide if it has the potential of creating such a large amount of frustration, and it is much simpler to guide oneself or use one of the many guided tours offered by the museum.

From using the technology we concluded that it would be essential to make simple technical improvements in order to make it possible to implement the game and then to expand the complexity of the tour. Along with fixing all the small bugs with the platform, such as changing key functions, a new function of the phone that automatically started the game and created a connection to the GPS is also very critical. This would limit the loading time of the game and make it much easier for the player to begin the game. Another way to help simplify the phones, would be to lock the GuideMe configurations on the platform. This would prevent the users from accidentally altering the proper settings of the phone for the tour, but still allow technicians to make the

appropriate changes. Incorrect settings can cause the phones to work incorrectly and possibly have negative implications on the museum experience.

One simple improvement would be to make the GPS more precise in order to increase the proximity of the POIs. Because GPS readings are accurate within a radius of 15 meters, the system can not distinguish between POIs within this range. If this improvement is made, many changes could be made to the game. For example, when the Old Lady Hagrid character meets the player in the woods, there could be an entire line of POIs arranged such that a conversation could take place as if Old Lady Hagrid was walking and talking with the player.

Another advancement which is essential to make the tour easy to use is the implementation of an auto-play feature for sounds and pictures. If sounds played automatically when GuideMe passed over the POIs, the player would not have to choose to load new sound clips by pressing the correct combination of buttons. Also, transitions would be smoother if GuideMe downloaded information of probable POIs. For instance, if the player was walking too fast or in the wrong direction, a character could inform the player to slow down or to change direction.

The expansion into a simple programming language with event syntax would also be a valuable addition. This would allow the user the ability to enable or change certain POIs only after a specific event has been triggered. A game could be created where certain POIs would have to be completed in the correct order for the player to win.

In order to expand the possibilities and complexity of the tour and to make it an actual game, the ability to support cascading events is crucial. Adding cascading events would add causality to the tour and allow the storyline to progress as certain events occur in real time. The tour could also become more interactive if the phone had the capability of knowing where and when museum actors would be at an exhibit. The phone could then guide the players to particular spots where they could then interact with human resources. Similarly if the phones detected fellow players within a certain the proximity of the user, additional interactive dimensions of the tour could be created to utilize this functionality such as asking the players to work together to solve a mystery. A similar idea is programming the phones to know what time of year it is. Seasonal tours could then be created and executed at particular times of the year.

Besides the many improvements in the technology, the team concluded that the game should be expanded to include more POIs, which would create a more complex, interesting experience for the user. Because the tour was created as a pilot test, it includes very few POIs and characters. This does not effectively capture everything the museum has to offer. Many interesting buildings, gardens and animals are left out.

Diverse audiences, spanning many age groups, can also be targeted for the tour. The tour should not be limited to only one age group; it must be open-ended because some of its aspects, such as the story or the technology, may interest other people besides the primary audience. Every age group includes people that do not fit the stereotype of their age. The museum can take advantage of this and urge more users to participate in the tour.

Once the technology is updated it should also be tested. Allowing the museum see how effective the tour is, thus helping them decide whether or not they should expand the game.

Finally, from observing the audience of the museum, it appears the museum's relationship with the local community is not as strong as it could be and can be enhanced through the introduction of local programs. While guests love to visit the museum, the connection between the museum and the surrounding audience can be improved, helping to draw in a larger audience.

Chapter 6: Recommendations

From our conclusions we found that there are many recommendations that the museum should carry out to help improve the tour. These recommendations can be fairly easily implemented by the museum and will greatly increase the use of the tour and the overall museum experience.

6.1 Evaluating the Concept

Once the technology of the mobile phone is updated and sufficient enough to incorporate the tour, the museum should perform a mock test using the developed tour to see how effective it is. If the technology was more advanced, we would have completed this as part of the project. From questionnaires given to testing participants, the concept, story, and technology could be evaluated. From these evaluations it is important to determine if the game interested the target audience and provided them with a new experience at the museum. Would visitors return to the museum to use the tour again? Would they pay to use it? How much frustration did the technology cause? These example questions are formed to extract answers from the users and allow them to answer in an open way. Included on the questionnaires should also be questions about the story line such as, what do you think happened to Klaus? And how do you feel about the superstitions included in the tour? These questions will help the museum evaluate the story and see if they are interested by the intangible theme. It is important that users answer these questions so that the museum knows if it is worth while for the museum to expand the tour and ask a third party contractor to implement it directly on the platform.

6.2 Implementing the Complete Version

Following the pilot test, the museum needs to work to expand the tour so that it is more intriguing and target a more diverse audience. One way to do this is to incorporate additional POIs into the tour. This will add depth to the story creating a more realistic experience and capture more of the museum's repertoire. Adding POIs would also make

the need for detailed directions to additional POIs less crucial since the user would easily discover another POI. Removing directions helps eliminate the potential frustration of users getting lost during the tour and allows the patron the freedom to tour the museum is a nonlinear fashion.

In order to keep the tour fresh, simple changes to the characteristics of the tour should be made. Alterations to the story line, characters, themes and POIs can be made in order to have an evolving story, allowing frequent users to obtain a new adaptation of the tour. The museum could also try to incorporate human actors into the tour by providing users with conversation starters to help visitors ask qualitative questions, thus increasing the learning experience.

We determined that the museum will help target additional audiences by implementing current booklet tours onto the system. People interested in using the technology, but not by the story of Klaus, may find tours of the gardens or manors more appealing. Similarly, people who are not attracted to the technology maybe convinced to try it, if they like the concept of the tour. A tour of picnic spots could also be created for interested visitors and would include the best places for snacks or lunch. In addition, old tours could be published and distributed to interest audiences that do not want to use technology. Unfortunately tours on paper may be difficult due to the non-sequential order of the POIs. Souvenir collections of the tours could also be created to help patrons remember their experience at the museum.

Finally, in order to make the GPS and mobile phone devices more ergonomic, the museum may find it valuable to create a simple device that holds the GPS receiver and the phone close together to help minimize the frustration of losing the GPS connection.

6.3 Maximizing this Approach

In order to increase the museum's relationship with the local community, the museum should invite artists to capture the intangible heritage of everyday life. The artists could try to paint how people felt in the early 1800s by creating images of three-legged dogs and of the mysterious stream man. The museum restaurant can then display the artwork helping visitors experience intangible ideas through visualization.

Another way to increase the museum's relationship with the local community is to expand the museum experience beyond the duration of the tour, both before and afterwards. To do this, the museum could provide local schools with briefing and debriefing packets with the goal increasing the depth of the experience for the students. The packet could include detailed lesson plans, and help students summarize their journey through the museum by asking them to depict their experience through drawings or paintings. The students may also be asked to create a story about the elves in the woods or any other superstitious creatures. Creating a supplemental website has a similar effect. The website could include activities for all students that could interest them in visiting the museum.

By performing these recommendations, a visitor's journey throughout the museum will become more enjoyable and educational. Visitors will be able to experience many new feelings and thoughts about intangible history from using the tour. Expanding the tour has the potential of attracting more than only the target audience, drawing new people into the museum. If the tour is eventually a success, Frilandsmuseet in Lyngby, Denmark will be recognized as a pioneer among all the Nordic countries by becoming the first museum to implement the use of GPS mobile phone tours as a means of viewing their exhibits and learning about the intangibles of Scandinavian history.

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Appendix A. Interactive Museums & Games

Interactive Museums provide visitors with many hands-on and multimedia based exhibits. Interactive museums are located world-wide including many in Denmark. This appendix contains detailed descriptions of museums and specific case studies.

A.1 Boston Museum of Science

The Museum of Science in Boston provides its visitors with lots of ways to interact with the exhibits. The museum has developed a six-stage plan called "Science is an Activity" in order to show that science is fun and can be learned through interaction. *Investigat*e, is the second permanent exhibit instated at the museum. The exhibit uses "hangs-on, mind on" activities in order to achieve the goal which "enables visitors to recognize and practice their scientific thinking skills" and to "allow visitors to experience the scientific process by asking questions, formulating hypotheses, performing experiments, examining evidence and drawing conclusions" (MOS, 2006). Another exhibit, *The Discovery Center*, allows young children to experience science by playing with common items. The center creates curiosity in preschoolers and helps stimulates their interest in science (MOS).

The museum is currently using a multimedia tour guide in the exhibit *Star Wars: Where Science Meets Imagination.* Toshiba e830s, shown in Figure 6, are being used to allow the user to access additional information on parts of the exhibit, including interviews with actors and scientists whose work is featured in the exhibit. The device lets users "bookmark" information they find interesting and create a personal website they can later use. The museum stated that this type of interactive multimedia includes "high quality audio, video, still photography, graphics, and text to enhance and expand the visitor experience" (MOS, 2006). The multimedia tour has proven to be very popular, continuously selling out.
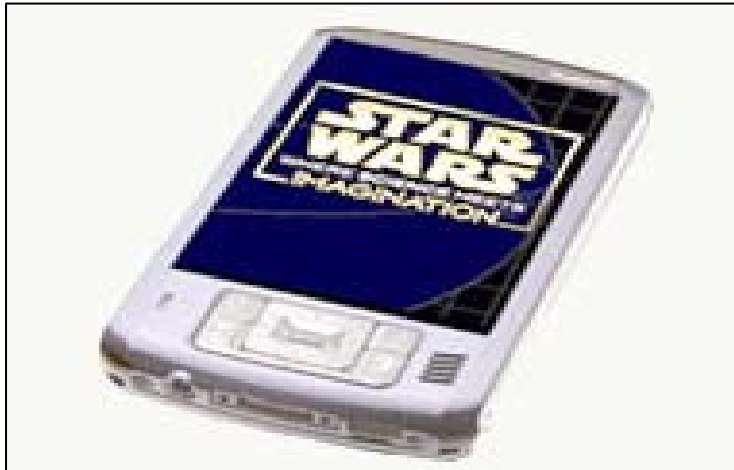
Figure 4: Toshiba e830s (MOS)

The Museum of Science in Boston acknowledges and embraces the benefits of interactive learning. The museum is constantly developing ways of introducing technology to the exhibits. Larry Bell, the 1996 Vice President of the Exhibits Division, stated that while introducing new exhibits, "The Museum kept the best of past exhibit styles, retaining a component of natural history, and assembling an eclectic mix of both subject matter and mode of interaction" (MOS, 2006).

A.2 Exploratorium

The Exploratorium in San Francisco, CA, is one of the most well known interactive learning centers in the United States. The museum describes itself in the Exploratorium 2005 brochure not as a museum but a "place that experiments with new practices for discovering the world" (Fish , 2). The Exploratorium provides its visitors with over four hundred hands-on and multimedia exhibits on science, art and human perception, allowing people to learn about the phenomenon of science for themselves (Semper, 1990). Founded by Frank Oppenheimer in 1969, the Exploratorium has repeatedly used interactive exhibits to provide a unique way of learning. The museum receives 530,000 visitors and over 18 million visits to their website annually. The success of the museum demonstrates that interactive learning is effective and popular (Fish, 2005). Many museums feature Exploratorium exhibits and in fact, Larry Bell (1996) from

the Boston Museum of Science states, "Exploratorium exhibits have been copied in science museums around the world.

The museum's award winning website includes links to information about exhibits, web cast of museum programs, and interactive games for children of all ages. "Voyage to Epsilon Eridani 3" is a computer game that allows the user to learn about special relativity. As the user is challenged to travel to Epsilon Eridani 3, a planet located 10 light-years away, in time for a birthday party in 20 years. "The Secret Lives of Flowers" and the "Microscope Imaging Station" are just two other of the many links on the website. The website allows people worldwide to experience the thrill of the Exploratorium, and the interactive games help the visitor's curiosity grow. (exploratorium.edu, 2006).

A.3 Techniquest

Techniquest, a science discovery center located in the United Kingdom, opened in 1986. The largest interactive science center in England houses hands-on exhibits and live demonstrations (tquest.org, 2006). The innovative exhibits, developed by in-house workshop design teams, teach students through the use of activities.

Public appeal of Techniquest and their interactive exhibits is reflected in the number of visitors they received each year. According to their website, "Techniquest attracted around 100,000 visitors in its first year, compared to only 39,000 people in 1990 at the Welsh Industrial and Maritime Museum" (tquest.org).

A.4 Experimentarium

Denmark also recognizes the advantages of interactive learning and has developed the Experimentarium, a hands-on, interactive learning center. As stated on the Experimentarium website (2006), the Experimentarium strives to "stimulate citizens - particularly children and young people - to be active and curious and to use their imagination" and to "illustrate the interrelationship between Man, nature and technology". The museum has over 260 exhibits including *Dialogue in the Dark*, an exhibit that allows the user to experience the sense of blindness. Guided by a blind helper, visitors enter a room of complete darkness where they are urged to do several

daily life tasks. The exhibit description states, "With your sense of sight out of action, you are obliged to make use of your other senses. You learn to navigate in the world of the blind; to 'see' in a whole new way." (experimentarium.dk, 2006). The permanent exhibit *Sport and Spinach*, allows users to learn about what is important to their body by taking quizzes, learning about particular exercises, and playing in the indoor park with challenges activities including spiral hopscotch and the bicycle carousal.

The Experimentarium shows that Denmark has clearly embraced the theory of learning through experience. Integrating this theory through an interactive game into Frilandsmuseet will help create an exciting learning environment in this venue.

A.5 Methods of Bridging the Age Gap

While many museums successfully target young children and adults, several often find it difficult to capture the interest of students and young adults, specifically between the ages of 14 and 25. Suzanne Rider and Shona Illingworth (1997) emphasize the importance of grabbing the attention of young people in "Museums and Young People" and discuss several approaches that can be used to help bring in new audiences. Many museums have attempted to create ways to bring younger audiences into the museum. For example, Cartwright Hall, an art museum in Bradford, England, has had great success bringing life to the museum by developing exhibits targeting young people's interests. "Sound & Fury," an exhibition on heavy metal art, brought new visitors into the museum, many of which returned to the museum for other exhibits. Of all the visitors to the exhibit, 50% were between the ages of 13-34, the target audience of the exhibit (Rider, 1997).

In addition to developing specific exhibits for younger visitors, many museums have begun to create advisory teams and focus groups of students to help brainstorm ideas to make exhibits interesting to their peers. Young Tate is an advisory team at Tate Gallery Liverpool, England which helps to develop games and create workshops to interest visitors between the ages of 14 and 25. The almost 300 members of the Young Tate meet monthly to discuss ideas to make the gallery more appealing to the youth (Tate Britain Youth, 2006). Focus groups are similar to advisory teams and allow students to state what they like and dislike about museums. The Oldham Art Gallery found that

students like bright colors and music in the exhibits and would like interaction with artists and other museum workers (Rider, 1997).

Several museums have also tried to incorporate youths into the museum as volunteers or paid interns. The Brooklyn Children's Museum in New York developed an after school program which initially encourages students to participate in activities located at the museum and then urges them to become volunteers and eventually interns (Brooklyn Kids, 2006).

The need to interest youths is very important to museums because they compose a large part of the potential museum audience (Rider, 1997). Museums also have plenty to offer youths and act as an additional educational facility which can help broaden and expand the minds of its visitors.

A.6 Trilateration

Two dimensional trilateration requires only three distances but is fundamentally the same as three dimensional trilateration. In two dimensions, the first distance narrows down the location to a certain radius around the point from which the distance was calculated. In the case of the GPS, this point would be a satellite. In the case of our example, this point will be represented by a city. In either case another distance is required because the location we are trying to discover could be anywhere on the circle. In two dimensions, the second distance narrows down this location to the two points where the circles intersect. With only two locations to choose from, a third distance is used to determine which point represents the true location. This example is illustrated in Figure 7 where the location of Denver is found using its distances from Boise, Minneapolis, and Tuscon. Finally, to apply these steps in three dimensions, four points are required because the distances represent spheres instead of circles. (Brain, 2006)
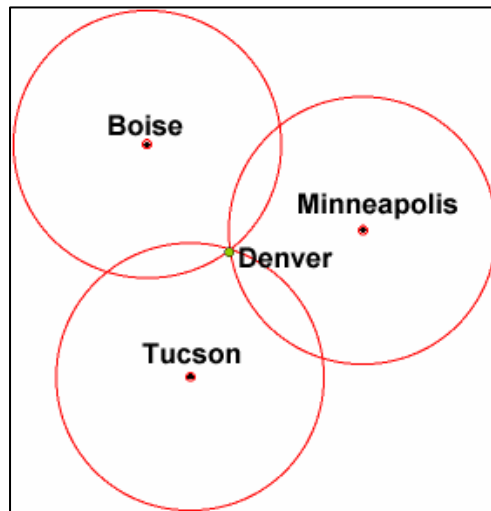
Figure 5: 2-D Trilateration (Brain, 2006)

A.7 Augmented Reality

Augmented reality uses computer displays to enrich the everyday world with digital information. For example, imagine a pair of normal sunglasses one might use for driving. Augmented reality allows the driver to see the name of streets printed before his or her eyes. Figure 8 illustrates how augmented reality might look.
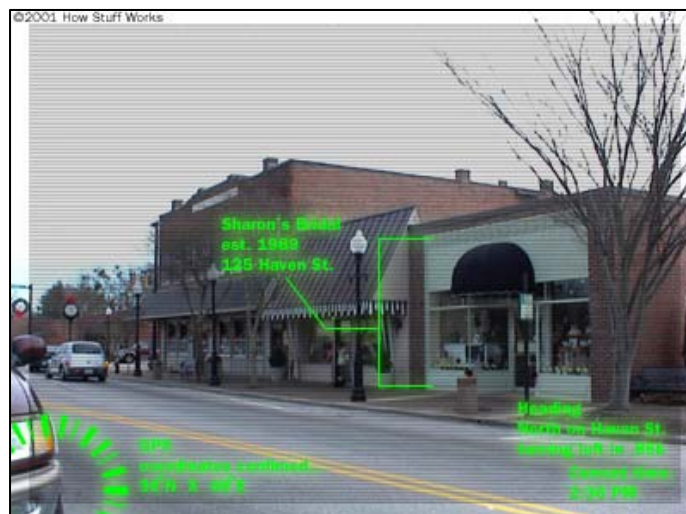

Figure 6: Augmented-reality displays will overlay computer-generated graphics (Bonsor, 2006)

A.8 MIT Handheld Augmented Reality Simulations

The MIT Teacher Education Program has been working together with The Education Arcade over the last three years to create "Augmented Reality" simulation games that combine real-world experiences with additional information supplied by portable handheld devices. Both indoor games using Wi-Fi (wireless networking) and outdoor games using GPS (global positioning system) technology have been piloted. The program is even running closed beta tests on software that allows users to program their own "AR" experience (Klopfer, personal communiqué, 2006).

Indoor Games
Wi-Fi (wireless networking)

2003 "Mystery at the Museum"
Description: Find the clues to catch the thieves
Unique Features:
- Interview virtual characters
- Analyze information using virtual instruments

2004 "Outbreak @ MIT"
Description: Contain a SARS outbreak
Unique Features:
- Cascading Events
- Actions that have immediate and/or delayed on the virtual environment and other players

Outdoor Games
GPS (Global Positioning System)

2003 "Environmental Detectives"
Description: Investigate contaminated drinking water
Unique Features:
- Briefing before mission

2004 "Charles River City"
Description: Investigate an outbreak
Unique Features:

- **Time dependence** – The game can now change over time. Non-player characters (NPCs) can change what they say, appear or disappear, and change

location based on the time in the game. Similarly, samples can change over time representing the dissipation of a chemical, or some biological change.

- **Distinct player roles** – Players take on one of several distinct roles in the game. These roles provide the players with special capabilities (e.g. being able to take certain kinds of samples, or receive unique information). The role also dictates what information players get from the NPCs (e.g. someone might say one thing to a police officer and something entirely different to the medical doctor).
- **Individual medical symptoms** – Individuals in the game can present with medical symptoms that are accessible by some range of the real players. These can also change over time to represent the progression or spread of a disease.
- **Increased role of data beaming** – Players can beam data that they collect to other players within the game. This information might be interviews that they have collected from disparate places or differing roles, or it may be field data that they have collected.
- **Cascading events** – Events can cause the triggering of other events. For example, speaking to one NPC might cause another NPC to appear somewhere else on the map (i.e. an NPC tells you about someone else with who you should speak). The triggering event may be something that a player experiences directly or come from information beamed to them by another player.
- **Greater stability and usability** – Improved GPS readings, application stability and organization of information make the game more flexible and useful

Appendix B. Interviews

This appendix contains summaries of e-mail correspondences and phone conversations conducted at the office of the Interactive and Global Studies Division in Worcester MA, with museum professionals around the world.

B.1 Klaus Jensen at Frilandsmuseet

Klaus Jensen, the liaison for our project, provided us with a better understanding of the project and what the museum is hoping to obtain from us. Currently, the museum has eight working mobile phones with GPS attachments. The phones provide visitors with information on buildings and track their journey throughout the museum. Visitors can take pictures and record sound clips using the phones. Since the last project completed by WPI in 2005, the system has been updated and has unlimited test, pictures and sound messages. Klaus informed us that the phones are programmed through a simple online interface which will allow us to easily change the information held on the phones. The museum would like us to create a game which includes role-playing in order to enhance a student's trip to the museum.

B.2 Rikke Ruhe at Frilandsmuseet

Rikke Ruhe, a curator and webmaster at Frilandsmuseet, provided the group with valuable insight regarding the setup of the game. She supported the idea of a role-playing premise for the game and likes that it encourages patrons to interact with one another. Role-interaction confronts players with choices specific to their role. Ms. Ruhe mentioned one idea of a role-playing game which incorporates social status. A game of this nature limits the choices a player can make based on their class, with the objective of demonstrating the dynamics of the social hierarchy of historical societies. Another scenario involves playing the role of the disabled or youth in old times, depicting the further difficulties handicapped and young people would have encountered in the past.

B.3 John Pickle at the Boston Museum of Science

John Pickle, the Program Manager for Global Systems Science at the Boston Museum of Science, provided us with important pointers for our project. In order to test the game for effectiveness it is important to monitor the use of the game by tracking it with software to observe if certain sections of the game are skipped or if people need additional help with any sections. We can leave a virtual bread crumb trail for visitors and study their progress during their visit to the museum. Mr. Pickle also recommended the AAA <u>Atlas of Science Literacy</u> in order to know what topics and skills 6th-8th graders have developed. He suggests that the team emerges our self in the age level to understand what they would find interesting. Also we must minimize text in the game so that we do not lose the users attention.

Mr. Pickle also gave us important contacts that will be very important. Eric Klopfer from MIT has some interesting work on StarLogo and on Augmented Reality Simulations. Dan Dowling, is the head of the Museum of Science Live Actors and can provide with information on human interaction as a teaching tool.

Finally Mr. Pickle mentioned that we need to include lessons learned and send out the paper when it is compete. People will be interested in the project so put in the extra effort into it when it is finished.

B.4 Tom Kelleher at Old Sturbridge Village

Tom Kelleher, a curator at Old Sturbridge Village, provided us with valuable information on what type of questions should be incorporated in to the interactive game. Mr. Kelleher mentioned that visitors are often overwhelmed when coming to the museum and ask simple, quantitative questions to the actors so that they do not sound dumb. If we could provide visitors with conversation starters and help them to ask qualitative questions we could greatly enhance their visit to the museum. Mr. Kelleher also mentioned that we need to acknowledge the intrusion of technology into the time period of Frilandsmuseet and that we need think about this and use it in a beneficial way to our project.

Appendix C. Frilandsmuseet Pilot Tour

This appendix includes the game script which is implemented on to the phones via sound clips.

Summary: Clog maker disappears on the way to Demesne Farm

Introduction: Klaus, the clog maker, has disappeared. The following walking tour will provide you with clues to reconstruct the events that led to his vanishing. Begin at the clog maker's cottage and listen to the dialogue from his wife and daughter. Each piece of the conversation will give you clues about his disappearance and on which place to visit next.

Estimated time: 1-1.5 hours

1. Clog maker's House (No. 68)
    a. Wife: "Hi. I can't talk right now - I'm really busy finishing these clogs for tomorrow. It would be easier if my husband, Klaus, were here, but he left to drop off a pair of clogs at Søren's farm – yesterday – I can't imagine what's keeping him… Or maybe I can – he's always getting himself into trouble if you know what I mean – and at the most inconvenient times too. If you see him, please tell him to hurry up and get back."
    b. Wife: "Søren's farm, don't you know where that is? It's right outside across the stone wall! You'd think that'd be an easy trip right"
    c. Klaus's Daughter, Trina: "It's too bad dad is away working. My friends and I play in his shop all the time, you know? We like watching him make all those pretty shoes. My friends from big yellow house don't have shoes. That's funny don't you think?
        • Pictures
            1. Tools and clogs
            2. Family Picture (Wife and Kid)
            3. No picture of Klaus because since game is about making inferences, we do not want to prime them with a picture
                a. Do not want people to judge some one from a picture

2. Poor house (No. 64)
    a. Hans' Mom: "You're looking for Klaus? You won't find that troublemaker here. He is a terrible influence on my little Hans, always stumbling around [drunken] in the woods …"
    b. Little Hans: "Do you like my shoes? Trina's dad gave them to me. My mom tells me to stay away from him, [whispers] but I think that's silly…."

   c. Hans' Mom: [Scolding] "That man dances with elves down in the wood! I won't have him stealing you away from me…. And as for you, I don't know why you want to go there, but if you insist, follow the road past the wheel wright's cottage and at the cross roads, follow the path that curves down and to the right. When you reach the mill farm, a path will curve left into the wood."
- Pictures
  1. Inside the Poor House
  2. Engravings of Elves

3. Wealthy Farm (Farmstead from Lundager) (No.71)
   a. Søren, wealthy farmer: "Klaus? Yeah he was here dropping off a pair of shoes he was mending for me - and let me tell you - they were damn expensive! I've got a hunch he's charging me for extra material."
   b. Søren, wealthy farmer: "I'm still fuming. I tried to take it up with him, but he ran off saying he had to make a quick delivery to the steward's manor."
   c. Søren, wealthy farmer: "The manor? Continue down the road until you reach a point where the roads cross. A large stone marks the correct path. Turn right when you reach Skipper's Farmstead and where the roads cross, turn left. You should be able to see it from there - it's a grand white house."
      - Pictures
        1. Søren, looking pissed
        2. Pictures of the Indoors

4. Woods
   a. Old Lady Hagrid: "Why hello there! You want to help support an old woman – don't you? What's that look for? Don't you be listening to what they say about me in town. I'm just an old woman trying to make an honest living, collecting medicinal roots and herbs."
   b. Old Lady Hagrid: "Klaus? O no, I haven't seen him *today*. But I run into him and his people all the time…. You know I met a forest man once. Now mind you, I was younger then and prettier than the form you see before you today. I remember it like it was yesterday. He just took me up in his strong arms…and we connected on a spiritual level if you know what I mean? You do know what I mean, don't you?"
      - Pictures
        1. Old Lady Hagrid X 3
5. Woods Continued
   a. Old Lady Hagrid: "If you're heading for the manner, I'll tell you how to find it. Just as soon as you leave these woods you'll find a long, lonely road… At the end you'll find the manor waiting for you, coiled there like a slithery snake, pale as snow."
   b. Old Lady Hagrid: "[Gasp] O goodness, deary me! I recalled a dream I had just yesterday. A nightmare it was. I was stirred from my slumber. In my eye, I had an image of a black dog with an evil stare. It was a shaggy wet

dog and it had one leg missing….You should check down by the stream. You never know - something bad might have happened."

6. On the way to the water (No. 21)
    a. Man: "What brings you down to the river? You're looking for the clog maker? I saw him going towards the steward's manor. Don't spend too much time around here. The water is mysterious, don't want to fall in. The stream man will get you. You know Old Lady Hagrid's daughter, Rikke, got stolen by the stream man, dragged down to the murky depths..."
    b. Man: "You know they say Old Lady Hagrid hasn't been right in the head since? But I think she's all right…More times than I can count, I'd be feeling like their was some specter hanging over me….Old lady Hagrid would give me some of those magic herbs and I'd be fixed right up. You know, I have the feeling she knows about things that we just don't understand."
        • Pictures
            1. Engravings of stream men
            2. Man
            3. Cool picture of the stream with some haze

7. Demesne Farm (Steward's Manor) (No. 25)
    a. Steward's Wife: "You're looking for Klaus? We've been expecting him since yesterday. My husband couldn't wait any longer and had to go into town, but told me to pay him for some clogs that were going to market. I don't know where he is."
    b. Steward's Wife: "If you could figure out what's keeping him, we would be very grateful. Come to think of it, you might want to check across the road down by the pond….One of the hands heard some strange noises down there last night."
        • Pictures
            1. Stewards Wife
            2. Picture of Inside

8. Picture of Clogs and jug next to stream

Appendix D. Game Design Document

This section of notes contains notes compiled while creating the game so that we could record possible game ideas and goals.

Game Summary
Patron has the freedom to mold their own museum experience. The collections are presented in a multithreaded fashion so that the stories can be intertwined.
The player can chose where they want to visit and based on these experiences they chose where they go next, inspiring them continue. A mystery theme keeps patrons engaged, allowing them to learn information as they explore the museum.

Game Overview
Concept
- Detective Story
- Time Traveling
- Class perspective
- Romance
- Scavenger Hunt
- Treasure Hunt

Interrupt their expectations, Make them look twice
Unforced learning
Interaction and learning: prompted not told. Want to use game and solve story
Facts should speak for them selves

Genre
Live-Action Role Play

Target Audience
Patrons that visit on a casual basis (families, dog walkers, single visitors, picnickers, couples) "The Sunday Crowd"

Experimental Audience
16 year old English speaking students

Novel Features
Blue tooth
Non-linear
Subliminal learning

Target Platform
Bluetooth Mobile phone with Life Pilot application with GPS receiver

Design Goals

Clear Expectations
Freedom to Explore
Guide me so that they can go anywhere
Each location should be a starting, transition and ending point
Should have a clear ending
Stories should be as implicate as possible
Variance of closure
Puzzles?

Game Play

Exploring
Each location suggests you to go some particular places, but game can continue where ever the players want.

Elements of Questing
Treasure Hunt/Scavenger Hunt
Reward schedules
Grading Scheme – Pass/Fail
Keep action up
Warning against getting treats, do it for the learning
Mundane Items in Large Numbers with goal of fully exploring
Collect Info (pictures, sound clips, facts)
Find another person and take picture
Linearity Issue: Open ended

Part 3: Production Details
Development Team

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Partners

Frilandsmuseet, Lyngby, Denmark
Danish National Museum, Copenhagen, Denmark
Nordic Handscape Project
Third Party Programmer

Hardware

Nokia Mobile Phones with Bluetooth

GPS Receiver

Software
LifePilot

Game World
4.1 Storyline Possibilities
Thievery
Murder
Intrigue
Class Struggle
Forbidden Love
Ghosts
Suicide
Marriage

Patron Characters
Patrons will receive phone and follow clues

Non-Patron Characters
Digital Characters

Areas
Live Tour
LifePilot Maps
Guidebook/collections

Appendix E. Step by Step Phone Instructions

1. Turn on Mobile Phone by pressing the button on the upper-right side of the phone
2. Enter Pin Code using key pad
3. When the main screen appears press the bottom left key
4. At the menu use the scroll in the center of the phone to navigate to LifePilot
5. Press the center of the navigation key to select the LifePilot icon
6. When the menu opens, select 3 by pressing the center of the navigation key
7. When the Blue LifePilot menu opens, select mobile guide
8. Select the Mobile Guide icon again when the green menu opens
9. When the Valeg many appears press Update Document with the middle of the Navigation key.
10. Press the button underneath the Valg key to open the next menu
11. Scroll down to the Positioning menu and press the middle navigation button
12. On the Position Screen select "GPS"
13. When the phone stops searching select the name of the GPS
   i. Ex (BT-GPS-00A192)
14. You will now be connect to GPS
15. Use the navigation button to put the cursor over icons
16. When your cursor moves over an icon a title bar will appear, to see for information, click the icon using the middle navigation button.
17. On the Vælg menu select "Hent info" – a waiting screen with appear with a bar and message saying "Henter Documenter"
18. Use the navigation pad to scroll up and down through the information.
19. To return to the map, select "Kort" in the lower right hand corner by using the button directly to the right of the navigation pad.
20. If on the map screen you click when not over an icon, a menu with "Zoom" and "Gem lokation" will appear. To return to the map screen, select "Tilbage" using the button directly to the right of the navigation menu.
21. Select "Valg" to open a menu and select the sixth item, "Guide mig! [3]", so that information automatically opens and the maps update. A blue stick figure will appear in the upper left corner of the map to indicate that you have successfully activated the guide me function.
22. If you accidentally close the life pilot menu, hold down the button on the bottom left of the phone and scroll to LifePilot menu.