CREATING AN IPED TOUR OF NANTUCKET

An Interactive Qualifying Project
Submitted to the faculty of
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Abstract

To enhance visitor learning and enjoyment, museums are transitioning from the traditional delivery of information via maps and guidebooks to the use of handheld interpretive and wayfinding devices. The Nantucket Historical Association desired a handheld device to disseminate information about its historic sites. To address this desire, we evaluated handheld technologies, tested their acceptability among NHA patrons, developed our own prototype tour, and then tested it. Our project resulted in an expandable prototype tour and recommendations for the NHA.

Authorship

This report was a collaborative effort, authored by Andrew Labrecque, Rob Matrow, and Brendan White. Subsections of the report were initially written by individual project members but were later edited by each group member intensively.

A collective ownership of all sections helped to create a more cohesive style in the writing. We also feel that by contributing to every section, we were all very comfortable with the subject matter contained within and therefore capable of discussing it with confidence.

The iPED Tour Scripts were written initially by the members of our group and later edited by the NHA interpretive staff. These individuals include: Dr. William Tramposch, Erik Ingmundson, Kim McCray, Anne Sweidel, Bob Hellman, Dorothy Gennaro, Doug Burch, Joan Pearce, John Belash, Judith Belash, Karen MacNab, Linda Steelman, Marcia Rubin, Michael Varbalow, Peggi Godwin, Richard Beckwith, Susan Berman, Susan Dupree, Terry Walsh, Tom Miner, Jay D'Apri, and Harry Payne II

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Table of Contents

List of Figures

List of Tables

1 Executive Summary

1.1 Introduction/Background

Throughout the world, and across the United States, museums, national parks, and other organizations have begun the process of modifying their interpretive offerings. By supplementing their existing tools for disseminating historical information (which include maps, guided-tours, and signs) with technology including GPS devices, cell phones, and iPods, these locations aim to increase accessibility and enhance the interests of museum goers. This modernization can enhance visitor understanding of history, the arts, and science in fulfillment of the educational mission of museums.

1.2 Problem Statement

The Nantucket Historical Association (NHA) is the leader in the interpretation of Nantucket's rich history. To this end, the NHA owns and maintains over twenty historic sites spread throughout downtown Nantucket. The problem facing the NHA is that some of these sites are not fully accessible to guests and residents because of their hours of operation, limited number of interpreters, and lack of sufficient wayfinding. By addressing these issues, the NHA hopes to increase visitation to its wide variety of historical locations in both the downtown and surrounding areas, which include sites such as the Quaker Meeting House, Old Mill, and Old Gaol. The goals of this project are closely related to the NHA's mission, "to preserve and interpret the history of Nantucket Island" (NHA, 2008).

To address these issues, the NHA proposed the development of an electronic walking tour–one that guests could use any time they wished and would achieve the NHA's aim of increasing visitation to these satellite historic sites. Our group began work towards the development of a prototype electronic tour, encompassing a subset of the NHA's historic sites and dubbed "The iPED Tour of Nantucket."

1.3 Goals & Objectives

The overarching goal of our project was to supply the NHA with an expandable electronic walking tour prototype, implemented on the technology platform best suited to fulfill the organization's unique needs, and the needs of their visitors. Such a platform would need to work

reliably and have a potential for future expansion. In addition to the prototype, our project would include a set of recommendations for the NHA suggesting how best to move forward in developing the full iPED Tour of Nantucket program.

In order to accomplish this overarching goal, our group identified and outlined a set of key objectives. To determine the optimal technology for the iPED Tour prototype, we first needed to collect information on the needs of the NHA and their guests. The next step was to form criteria based on the data collected and compare them against our research in order to suggest the technology best suited for the tour. Once a final decision was made, we would move forward with developing the tour, testing it, and delivering recommendations based on what we learned throughout the process.

By keeping the needs of the NHA and their guests in mind throughout the project, we aimed to stay true to the organization's own goals and objectives. When choosing a technology we had to keep in mind the financial and staffing constraints of our sponsor, as well as the educational and interpretive mission that the tour would need to help fulfill.

1.4 Choosing a Technology for iPED

1.4.1 Process & Methods

Before beginning work on our first objectives, we conducted background research on how different types of electronic tours function and the different technologies that are available. We were also in contact with museums, historical associations, and technology companies from around the United States to discover more about the different types of electronic tours currently offered. This information was compiled into our literature review. During our proposal presentation we showed the NHA the different technology options that we had identified and researched. Knowing ahead of time the advantages and disadvantages of different types of electronic tours was especially useful in the early stages of this project.

Although not a common method of data collection, role-playing as tourists was very useful and applicable to this project. Since none of our group had ever been to Nantucket before, we were able to tour the island initially without any preconceptions or navigational experience. Literature relating to the behavior of tourists and museum visitors was especially useful during this task as

well, where we were able to experience much of what we had learned. This helped us to begin analyzing what technology would be most practical, and how to best conduct a guided excursion from a tourist's perspective.

Because this project was essentially the design and implementation of a product for the NHA, we approached our sponsor as a customer and their guests as the end users of the tour. We began our work on the island by learning as much as we could about the NHA. We held meetings with the NHA's department heads, interpretive staff, and other important individuals to better understand their need for an electronic tour and to establish a clear direction for the project.

We also used surveys to collect data from visitors to the NHA's Whaling Museum to determine in a broader sense the opinions, statistics, and feelings of potential users of the iPED Tour. The survey consisted of questions that helped us determine the interests and expectations of visitors and the desired medium for an electronic tour.

1.4.2 Results & Outcome

From the information we gathered from the NHA, their visitors, and our archival research, we determined that the cell phone platform was ideal for the tour. This was due to the fact that 89% of guests surveyed owned cell phones, the NHA's limited time and resources for vending hardware, and the ease of accessing tour content seamlessly over the phone. Cell phone tours work by having users call a phone number, enter a number associated with a stop or exhibit, and listen to a prerecorded audio segment.

1.5 Developing a Cell Phone Tour

1.5.1 Process & Methods

With a technology chosen for the prototype, our next objective was focused on learning as much as possible about cell phone tours, speaking to various vendors as well as their customers. We interviewed representatives from these organizations to gather information about the intricacies of cell phone touring technologies, and gained insight into the differences and similarities of the different cell phone tour providers.

Parallel to this we began developing the scripts for the ten historic sites that would make up the prototype. Working in collaboration with the expert interpreters of the NHA, we revised these

scripts to form the content for the tour. Literature on museum studies showed that it was especially important to balance the volume of information present in each segment, providing enough to tell a coherent story but not too much as to cause listener fatigue. Upon completion of the scripts, they were recorded and uploaded to a trial tour system provided by OnCell Systems.

After developing a working prototype, we conducted testing to aid in its analysis and to provide feedback on its functionality, interface, and content. Testing was conducted with fellow WPI IQP students, a limited number of visitors to the Whaling Museum, local residents, and NHA staff members. This testing consisted of hands-on interaction, followed by an exit survey to gather information and feedback about the tour. From this we evaluated the success of our implementation as well as the decision to utilize cell phone technology during the first phase of our project.

1.5.2 Results & Outcome

Throughout the entire process, we compiled a wide variety of results. The guests' needs and wants, as gathered from the survey, were critical for the development of the prototype and the selection of content for the tour. Additionally, feedback from museums and tour providers suggested that signage was a key concern, as was the need to keep the segment lengths under two minutes. Our testing proved the latter to be true with visitor feedback suggesting that the segments be even shorter, possibly only ninety seconds in length. Also, the lack of street signage and minimal identification on the buildings created some confusion for the participants, yet the map handout we provided proved useful in these situations.

A critical component to the success of a cell phone tour is the quality of the provider. Through our contact with OnCell Systems, Guide by Cell, and Spatial Adventures, we gathered information on price, features, and customer service. Guide by Cell was eliminated as a company due to its higher than average price. Although Spatial Adventures had the best price, the quality of service offered by OnCell Systems set them apart from the other two providers. Apart from this, the features offered by the three were nearly identical.

Another instrumental piece for the success of the iPED tour is cell phone coverage at the historic sites. To achieve this end, we observed the signal strength of AT&T, Verizon and T-Mobile

using different generations of cell phones. The results showed that there is excellent coverage on both older and newer phones from these providers at all of the locations on the iPED tour.

1.6 Conclusions & Recommendations

From our perspective, this project has been an overall success. We are confident in our technology selection because our research data, survey results, and the desires of our sponsor all converged with cell phone based tours as the ideal solution. Unfortunately, the feedback collected during the testing period was limited, due to the small number of potential users available during the off-season. However, what feedback we did receive has been quite useful in making recommendations on how to improve the tour, leading us to believe that the prototype testing was successful. The user-interface of the cell phone was simple to use for the majority of participants and many did like the idea of a cell phone tour. The map handout was useful for guests but navigation would have been greatly assisted through the addition of signs at each location. The testing also found that most users wanted more enthusiasm and clarity from the narrators, and some thought that the segments were too long.

We recommend that the NHA use OnCell Systems for one season, and then determine the feasibility of operating the tour in-house. We also recommended expanding the prototype tour to include the remaining sites, a process made simple through the OnCell web interface.

2 Introduction

An increasing number of museums and tourist destinations across the world are in the process of updating and improving their current interpretive and guiding methods with new technologies. They are transitioning from the traditional techniques of maps, guidebooks and live interpreters, towards electronic, handheld interpretive and wayfinding devices to efficiently improve visitor enjoyment and learning. The field of modern handheld technologies is constantly evolving and expanding, making selection for any organization difficult. It is important to consider which type of technology is ideal for any specific organization and their patrons.

The Nantucket Historical Association (NHA) is concerned that many visitors do not fully appreciate the variety of opportunities offered in Nantucket, including the twenty-three historic properties that the NHA maintains. "During the past two years" the NHA "has greatly expanded its programming and is now interested in producing a transportable tour of the historic sites throughout town" (W. Tramposch, personal communication, September 1, 2008).

The NHA desires to provide visitors with the ability to explore and learn about the history of downtown Nantucket autonomously. This service would not replace the existing interpretive services currently offered by the NHA's staff. It is meant as an enticement to attract greater visitation to less visited sites. In recent years, several other organizations around the United States have developed and implemented tours, similar to what the NHA proposes.

The NHA requested assistance in evaluating the plethora of devices and technologies available. Our goal was to determine the organizational and visitor needs and identify which technology is best suited to meet them. In order to accomplish this objective we conducted interviews with members of the NHA staff and surveyed visitors to the museum. We additionally contacted museums and tour manufacturers to further our research into the advantages and disadvantages of the technologies. Conducting this research, receiving feedback, and determining what the NHA and its visitors desire in a tour was crucial. Our recommendations will lead towards the expansion of the NHA's interpretive offerings. Once a tour technology was chosen, we worked closely with the NHA developing a prototype using the desired technology for testing and additional recommendations based on that testing.

This report outlines the background research for our project, which focuses on museum and tourist studies and some specific technologies that may fulfill the NHA's desires. Additionally, we outline our methodology, a sequence of meetings, surveys, and observation that culminate in the development of a prototype tour. Our results and analysis section gives a summary of the outcomes of our methodology, which all lead into the final conclusions and recommendations.

3 Literature Review

3.1 Introduction

Our background research for the iPED Tour of Nantucket project covers two broad topical areas. First, we examine research on wayfinding by tourists and museum visitors. Second, we explore some of the latest technological devices that have been used at museums, national parks, and tourist attractions in recent years.

One of the overriding goals of history museums is to educate visitors about history in an engaging way and to "communicate historical information" (p. 261) by acting "as 'enablers' to the past" (p. 262) (Goulding, 2000). "Since the late, 1980s there has been increasing pressure on museums to widen their appeal in order to attract larger and more diverse audiences" (p. 261) (Goulding, 2000). Museums have tried to do this in a variety of ways, including through new programs and exhibits that increasingly use computers and other technologies to engage visitors. Several zoos and various museums have also employed these technologies as wayfinding and interpretive devices to enhance the visitor experience and thus encourage greater visitation.

The second topic area of our research relates to the technical background of our project, focusing on profiles of selected tour guide technologies used at museums and tourist destinations across the world. In these technology profiles we examine multiple options and the advantages and disadvantages of each. This information proved to be especially beneficial for the Nantucket Historical Association (NHA) when we introduced the available technologies in our proposal presentation.

3.2 Museum & Tour Information

The NHA's interpretive offerings include a set of historical properties that extend beyond the confines of the central Whaling Museum and across downtown Nantucket. Since Nantucket is a tourist community, a large portion of NHA visitors are tourists. For this reason, we focus on both tourist and visitor studies related to low-tech guides and the advantages of upgrading to technological wayfinding and interpretation alternatives. We merge these two topic areas to find the best information available for our sponsor. It is important, however, to recognize the

distinction between tourists (who are often visiting from off island) and museum visitors (who may be either island residents, or from off island). The two groups are often not mutually exclusive.

Tourism can be a very social, and group oriented activity, a factor that has to be considered when working on an interpretive program at a museum whose audience includes tourists. Brown and Chalmers (2003) studied the actions of tourists and showed the importance of considering them as more than just individuals, since "79% of leisure visits involve groups of two or more" (p. 340) (Brown & Chalmers, 2003). When traveling in a group, individuals will often split off to visit different sites and will need to coordinate where to rendezvous. Besides interacting with the people in their immediate group, tourists also like to be in contact with other friends and family through pictures and video, email, and even blog entries (Brown & Chalmers, 2003). Brown and Chalmers (2003) also found that tourists talk amongst themselves in informal social settings to exchange advice about different attractions. Goulding corroborates this fact and stresses that while on vacation many people seek enjoyment through the company of others and not merely by visiting every historic building on the itinerary (Goulding, 2000). The ability to design an electronic tour, while at the same time maintaining the ability for people to tour as groups, is especially important since many electronic tours "reinforce a societal trend toward isolated, individualized experiences," (p. 5) which may result in limited usage or a negative experience (Schwarzer, 2001).

Guidebooks and paper maps are two of the more basic methods used by tourists to navigate a setting and locate destinations. Brown and Chalmers (2003) found that most people used both, with few having used digital versions of either (although admittedly the availability of devices capable of presenting such digital information has grown by leaps and bounds in the past five years). The guidebook and map are designed to collect information on what to do, where to do it, and how to find it—displaying it in an easily readable format. Brown & Chalmers (2003) report that people often find maps and guidebooks cumbersome, outdated, and poorly or inaccurately labeled. This can cause many problems, which are compounded by the fact that tourists can be unfamiliar with an area to begin with.

While it is important to consider the fact that visitors and tourists dislike becoming lost, we must also acknowledge that many do not enjoy an overly structured tour, and wish instead to explore at their own pace. A survey in the German tourist town of Heidelberg estimates that only 7% of visitors go on guided tours (p. 997) (Kramer, Modsching, Hagen, 2006). This evidence demonstrates the importance of balancing too much and too little direction in a guided tour. To address this, many museums and parks try to arrange exhibits (or attractions) into logical themes, intended to minimize disorientation and help visitors make conceptual connections. In addition to the arrangement of exhibits, museums typically provide additional guidance, in the form of placards and signs, allowing patrons to find their way around without the use of a map. This enables visitors to guide themselves and view what attracts their interest based on what is around them.

The process of free-choice learning "tends to be non-linear, is personally motivated, and involves a considerable choice on the part of the learner as to what to learn" (p. 13) (Falk & Dierking, 2000). This method, as with any other, has positives and negatives. The primary benefit is that the learner is independent, free to move through the exhibit without the control of a tour guide, and is able to do so at his or her own pace. Unfortunately, since the learner's desire and interests are what guide this type of tour, the majority of available knowledge is often passed over, leaving the learner unaware of what he or she may have missed. As said before, in order to allow visitors to stay in control of their stay while still showcasing all of the exhibits in a museum, a balance has to exist between complete "free choice learning" and linear guided touring.

Since many visitors dislike overly structured tours, Brown and Chalmers (2003) suggest a system in which a device could "push" information to the user based on their location to show nearby attractions and help "support serendipitous discovery" (p. 351). Avoiding wasted time traveling from one location to the next supports the notion that "getting from one place to the next is half the fun" (p. 331) (Brown & Chalmers 2003). In addition, Brown and Chalmers (2003) suggest that the information provided by the portable device "while [visitors] are actually at an attraction may have limited utility, since at that point the environment is likely to contain richer sources of information than can be provided" (Brown & Chalmers 2003). This assumes that there is some interpreter or text available to disseminate this information, as will be the case at some of the NHA's sites. If this is not the case, then a portable device will be even more useful. An important

factor related to this is the balance between too much and too little provided information. When the Whitney Museum of American Art implemented an electronic tour, it found that it "resulted in people looking down at computer screens while standing in front of a painting" (p. 5) (Schwarzer, 2001). This attachment to the tour device and lack of attention to the visitor's physical environment is something that needs to be considered on all types of electronic tours (Schwarzer, 2001).

Kramer et al. (2006) argues that "a lack as well as a flood of information can be disorientating" (p. 997) and will cause visitors to follow the crowds to the major sights, and miss many of the other less traveled ones. This can result in a polarization of crowded and deserted areas, and while people are drawn towards exhibits and attractions with large groups (since a popular exhibit likely correlates to something interesting and enjoyable) crowding should be minimized if possible since many people become uncomfortable and find an exhibit unpleasant when it is crowded (Goulding, 2000). Museum interpreters often have to make decisions regarding how best to move groups around the more interesting crowded exhibits and return at a later time after the excitement has subsided. An automated system for tracking all visitors and guiding each of them in a pattern designed to limit crowding would be useful in this case.

An electronic guide also has to be designed specifically for the visitors or tourists who will use it. Containing a much smaller screen than a computer, the software must be easy to use and well designed with respect to the added distractions that a tourist experiences (Kramer et al., 2006). Since most people will have little to no experience with any device provided to them, the interface needs to be simple, the learning curve has to be short, "the platform's complexity must be hidden, and the guide must be immediately usable and require no user effort" (p. 35) (Bellotti, Berta, Gloria, and Margarone, 2002).

The above research is essential background information for the NHA's iPED Tour of Nantucket and provides an overview of the issues and challenges related to the visitor experience as a result of increased use of technology. As museums and tourist destinations across the world begin to utilize more advanced methods for delivering tours and information on attractions, experts consider questions relating to the level of guidance and the quantity of information provided through these methods. In addition to serving visitors, interactive portable guides have the

potential to help those who run museums and tourist locations by drawing crowds to lesser known attractions, and providing ways to learn about the history of historic towns and cities. This is one of the main purposes of the NHA's iPED Tour of Nantucket.

3.3 Technology Profiles

Understanding the state-of-the-art in wayfinding and interpretive technology is a critical component of our background research. The NHA would prefer to provide only the software for the tour, avoiding the complications associated with vending hardware altogether. The advantage of providing only the software is that the museums would not be required to purchase and maintain the hardware devices, or prevent their loss due to theft or damage. Distributing either hardware or software to visitors each poses a different set of challenges as well. In the case of hardware, the personnel needed to distribute hardware may not be readily available, especially in the case of smaller organizations such as the NHA. Due to the wide range of hardware and software variations, providing software that works and can be distributed to all types of hardware used by visitors is also difficult.

To help assess the best possible solution, we must ascertain what multi-media technology is being used by the general public in the United States and other parts of the world. As part of their recent research into the acceptance of mobile devices, Kim, Park and Morrison (2008) surveyed 283 people about their usage of mobile devices. From this study we learned that over 95% of those surveyed own cell phones, 27% use Personal Digital Assistants (PDAs), and only 9% use portable GPS, as shown in Figure 1 (p. 400) (Kim, et al, 2008).

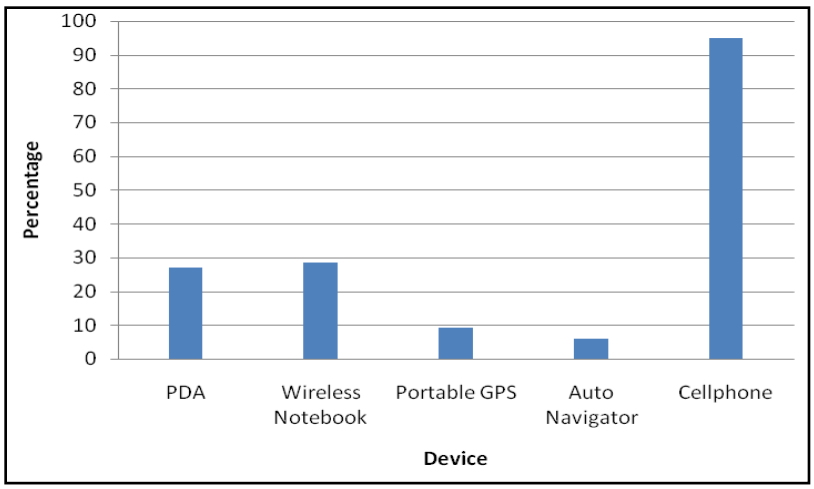


Figure 1: Ownership percentages of handheld devices (p. 400) (Kim, et al, 2008)

Museums and tourist destinations around the world have already implemented working systems that meet many of the NHA's requirements for a guided tour of Nantucket. These existing systems utilize a wide range of technologies that include, but are not limited to, mobile handheld computers, city-wide wireless networks, handheld Global Positioning System (GPS) units, and Radio Frequency Identification (RFID) tags and readers. The knowledge gained from these various implementations and their respective profiles helped to inform our recommendations to the NHA for the iPED system. These examples show the pros and cons of certain technological solutions, as well as the effectiveness of each in certain situations.

3.3.1 Audio Based Systems

Audio-based tours began with the use of portable cassette players and headphones, and have evolved in many ways since then (Nickerson, 2005). Modern players allow users to take a tour in a non-linear fashion and only listen to what interests them. These systems allow museums to provide flexible tours without the use of museum personnel. The use of audio-based tours can improve the experience of visitors by increasing their retention of information. A recent study found that 6 percent of visitors retained information from labels compared to 30 percent who retained it from listening to the information (p. 1) (Schwarzer, 2001).

Although there are many benefits, audio tours also have limitations. Even though they do not have to be completely linear, listeners are often forced to listen to audio segments that may not interest them. In addition, most audio tours lack images or video, and are unable to recognize a

listener's location, forcing users to both navigate unfamiliar locations and determine where to listen to each section (Schwarzer, 2001). This might be addressed by supplementing the tour with a map or guide showing pictures of each stop along the tour.

The proper creation of audio segments for the tour is a critical component to its success. The narrator needs to engage the audience and convey information in a way that is understandable to a diverse group of people. Many audio tours are met with criticism for having dry narration or containing terminology and content that does not appeal to the audience (Schwarzer, 2001). Production of high quality audio produced in a professional studio by a professional actor is another attribute of a good tour (Nickerson, 2005).

3.3.1.1 iPod and MP3 Players

In recent years, the music industry has been at the forefront of technological advancements. Modern music devices, such as iPods and other MP3 players, are small enough to fit in a shirt pocket, utilize standardized universal-formats, and are able to contain hours of multimedia content. In December 2007, the Pew Internet Project discovered that "34% of American adults and 43% of internet users" own an iPod or MP3 player (Madden 2008).

These devices could be used to deliver interpretive wayfinding tours for the NHA. The content could be arranged as a single track that would guide users from point to point in a specific order, or as a set of multiple tracks that the user would select upon reaching a destination. Both variations would be possible through the built-in interface of the user-provided device. Additionally, many models feature color screens that allow for the display of video and photographs.

Unfortunately, iPods and MP3 players were designed as single user devices through the use of headphones. In order for each individual to hear the tour, all the members of a group would need their own device, or would have to utilize a headphone splitter to allow multiple people to listen simultaneously. This means that users would have to tour while plugged into the same device. This could hinder movement and contribute to aggravation. Additionally, the user would be required to download tour content using his or her personal computer prior to visiting the museum. This is due to digital music protection and licensing, which prevents the unlawful transfer of copyrighted material.

3.3.1.2 NaturePods

An extension of the iPod or MP3 device is the NaturePod, a downloadable personal tour and field guide. Currently, this audio or audio and visual guide "provides a depth of knowledge to enhance your visits" (¶ 3) to several national parks and natural sites around the U.S. (Condon 2008). Downloadable to your current audio or video compatible device for less than $20, the NaturePods can be used at any time "before, during and even after your trip" (¶ 3) (Condon 2008). NaturePods are recorded by experts and enthusiasts in the field, including Dr. Michael R. Pelton, Professor Emeritus at the University of Tennessee, Knoxville as well as the NaturePod creators, Nancy and Tom Condon (Condon 2008). Although, originally created as a guide for nature tours, including information on various types of flora and fauna, converting this to contain NHA content about Nantucket would be a relatively simple process. Since NaturePods is reliant upon an iPod or MP3 device, it shares the same drawbacks.

NaturePods shows the relative ease with which the NHA could record and develop its own iPod-based audio tour podcast.

3.3.1.3 Cell Phone Based Tours

The latest medium of audio tours being implemented by some museums utilizes visitors' own cell phones. Cell phones are an ideal choice for consumer provided hardware since an estimated 1.5 billion subscribers exist worldwide (as of 2004). To listen to a recorded segment about an exhibit or location, visitors dial a telephone number and enter a number that corresponds to where they currently are in the tour (Nickerson, 2005). Cell phone based tours have been well received by many art museums like the National Gallery of Art, and have also been introduced to some metropolitan cities like Boston, New York City and Washington DC (National Gallery of Art, 2007; Metz, 2004).

The primary benefit of this type of system is that the museum does not have to provide the hardware for the tour. This is advantageous because many museums find that traditional audio tour hardware is costly to purchase, hard to maintain, and prone to failures. This technology also allows users to tour a much larger area since cell phone coverage is so vast and museums do not have to worry about losing hardware.

Although cell phone based tours have many strengths, they also have some weaknesses. Cell phone reception is one factor that has to be taken in to consideration, especially in large buildings or rural areas. From the perspective of a cell phone carrier, the tour is simply a collection of telephone calls. Users must therefore be aware of airtime charges and roaming fees that might apply (Nickerson, 2005). An additional factor that has to be considered is that the tour relies on the visitor being able to locate the numbers that relate to each segment of the tour. While this is trivial in art museums and the other venues for which this technology was designed, the distributed nature of the NHA sites and properties poses potential logistical problems.

Since the FCC mandated that cell phone companies provide 911 dispatchers with the location of callers, the use of GPS in cell phones has risen. Although the use of GPS for location-based services in tours seems logical, the reality of the situation is more complicated. The law only mandates that a caller's location be "accurate to within 50 to 300 meters depending on the type of technology used," (p. 2), resulting in the use of both GPS and triangulation between cellular towers to determine location. The latter method has substantially lower accuracy (FCC 2008). An additional problem is that even though many cell phones have GPS capabilities, many cell phone companies disable anyone other than themselves from utilizing those capabilities (Adomatis, 2008).

3.3.2 RFID Based Systems

The Radio-frequency identification (RFID) method of remote storage and reception of information has advanced significantly since its first use as a 'spy' technology. While still used as an information gathering tool, RFID is now used for more peaceful and intellectual purposes. The two primary components of RFID systems are readers and "tags." The readers store the information, and when a tag is within range, the reader displays the information corresponding to that specific identifier. The tags are minute enough to be concealed easily at stops along the tour, including behind, on, or within exhibits. We have found a variety of applications of RFID technology that might prove useful in a tour for the NHA. Sherry Hsi and Holly Fait report that RFID is becoming "increasingly affordable," (p. 60) making it a viable alternative for location-based tours of indoor museums. In their article on RFID in museums, Hsi and Fait (2005) describe a system that utilizes the technology.

3.3.2.1 eXspot at the Exploratorium

The eXspot system used at the Exploratorium in San Francisco "bookmarks" exhibits visited by museum patrons so that they can access further information on them at a later time (Hsi & Fait, 2005). The museum mounts RFID readers on exhibits and visitors carry "RF tags" with them throughout the museum, as shown in Figure 2 on the left. The readers are activated when the tags are waved "within a few inches" (p. 62) of these access points, triggering some form of interaction with the exhibit (Hsi & Fait, 2005). One example of interaction is the taking of a photograph that can later be accessed on a dynamic webpage, as shown in Figure 2 on the right (Hsi & Fait, 2005).

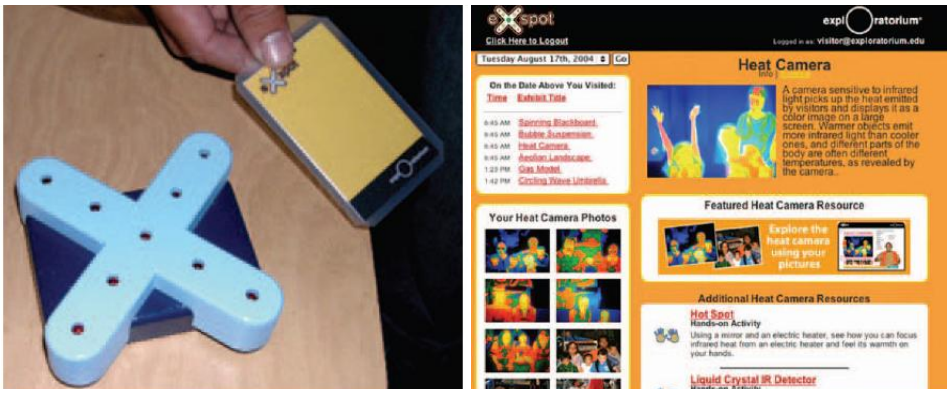


Figure 2: RFID reader, tag, and webpage (Hsi & Fait, 2005)

Authors Sherry Hsi and Holly Fait cite museum research which reports "the typical dwell time at exhibits" to be "approximately 30 seconds" (Beer, 2005). According to this article the "project proved to be more successful at accomplishing the Exploratorium's goal of increasing 'visitor engagement while preserving the interactive exhibit experience'" (p.6) (Witschey, Parry, Maurakis, Hagan, 2006). Another advantage of the eXspot implementation is its possible secondary application as a source of important data for museum curators in gathering information on the popularity of exhibits and the movement patterns of visitors. Tracking features like this can be highly useful for evaluating the success of a system.

The Exploratorium's evaluation of the eXspot RFID system highlighted a number of problems with RFID that result from a lack of experience using the technology (p. 64) (Hsi & Fait, 2005). Exploratorium researchers observed visitors waving cards out of range of readers and removing them too soon to be completely read. The Exploratorium proposes "an approach" for educating

its patrons “that includes… a public display and… demonstration explaining how to use RFID cards” and “how RFID works in practice” (p. 65) (Hsi & Fait, 2005).

3.3.2.2 Pal Mickey

Other variations of RFID technology are currently being used throughout the world. An example of this is the Walt Disney Company’s Pal Mickey. The Disney “Imagineers” have developed and implemented an “interactive tour guide…the first of Disney’s smart toys” (p. 1) (CIOinsight, 2004). According to Disney’s own website, the device contains “over 700 fun facts and Theme Park tips” all within a small Mickey Mouse plush doll. This is all made possible using a proprietary version of infrared technology, multiple types of sensors within the doll, and more than 400 transmitter-enabled locations within the parks (CIOinsight, 2004). When a user squeezes Mickey’s hand or tummy, the internal computer will either produce information about where in the Disney Park it is or, if out of range of the sensors, tells a joke. It was designed to be a personal item, requiring guests to hold Mickey to their ear in order to hear what it has to say.

CIOinsight additionally discussed numerous drawbacks to this instrument. Users have repeatedly complained that the volume of the speakers is not loud enough for the information to be heard by a group because of the noise of crowds. The makers of the device responded, saying “it's something that could be improved. But we designed the experience to be personal. We wanted you to hold it to your ear” (p. 1) (CIOinsight, 2004). Another drawback is that it is a child’s toy, designed specifically for families with small children. We surmise that older groups may not be keen on walking around in public getting information from a plush animal.

3.3.3 GPS Based Systems

In order to function as the NHA intends, the iPED Tour of Nantucket may need to determine the precise and current location of users relative to the various landmarks scattered around the island. While this technology may seem far-fetched, experts from Lancaster University have claimed that advancements in “GPS and network-based services” – such as those which allow emergency workers to pinpoint those in distress – will allow “future mobile users” to have “access to accurate positional information” in real time (p. 8) (Davies, Cheverst, Friday, Mitchell, 2002). There are already a number of systems implemented around the world that use GPS in this manner. The location error of GPS when used outside in ideal conditions is less than

10 meters (33 ft.), although when the device does not have a clear line of sight to the satellites in orbit (when inside building or around tall buildings for example) the margin of error can be greater (FCC, 2005, p. 10).

3.3.3.1 The Lancaster GUIDE System

In 1997, Professors Nigel Davies, Keith Cheverst, Adrian Friday, and Keith Mitchell of Lancaster University began work on a "context aware tour guide for visitors to the city of Lancaster," England (p. 8) (Davies, et al, 2002). Their work resulted in the Lancaster GUIDE, a network of wireless mobile devices deployed for testing in the city in 1999. Connected to the web via an 802.11 wireless network, visitors use portable tablet computers to "discover information about the city, interact with online services, and obtain walking directions, either to a single destination or as part of a tour" (p. 9) (Davies, et al, 2002). This system is to Lancaster what the iPED might be for Nantucket: a transportable tour for informing tourists of information on important locations. Any information and lessons learned from the making of the GUIDE system could be key factors for the implementation of the NHA's iPED Tour.

In a separate article, the professors from Lancaster University explained some of the key choices they made while designing the Lancaster GUIDE system. For example, the Fujitsu TeamPad 7600 tablet PC was selected over other similar devices based on the readability of its display in direct sunlight, its size to weight ratio, processor performance and affordability, and the compatibility of desired operating systems and drivers. Battery life and durability were also mentioned, but seemed to be more of an afterthought (Cheverst, 2002). Similar parameters should be considered in the selection and evaluation of devices for iPED. Durability and battery life must not be overlooked.

Age Profile	Number	Gender		Previous Web Experience
		Male	Female	
10-20	6	4	2	6
21-35	15	7	8	7
36-55	26	12	14	8
56-70	13	6	7	1

Figure 3: Demographics of GUIDE field test (p. 29) (Cheverst, 2002).

Following deployment of the GUIDE system, the team carried out a field test on the sample shown in Table 1 above. Public response to the GUIDE system in Lancaster was mostly positive. All testers reported that they "enjoyed using GUIDE to explore the city" (p. 10) and believed the information provided to be accurate (Cheverst, 2002). In general, testers were comfortable using the hardware, but those "without previous web experience… found the flexibility provided by the tour guide [software]… bewildering" (p. 10) (Cheverst, 2002). An interesting – although somewhat expected – point of data was "that visitors in the 10 to 20 age profile… visited approximately twice as many links as those from other age profiles" (p. 10) (Cheverst, 2002). The question of whether these pages were "read and assimilated" (p. 10) was called out in the study for further investigation. Regardless, this information provides a key sample showing an overwhelming public acceptance of a mobile device-based tourist guide.

3.3.3.2 GPS Ranger

The GPS Ranger is a system currently being used at numerous sites around the United States and has the potential to be the ideal platform for the NHA. It is a "handheld GPS video tour guide device… can be programmed with unlimited content including documentary-like video, compelling audio, text, animation and still photography that is automatically delivered as visitors approach pre-determined locations" (¶ 1) (BarZ Adventures, 2008). According to Bar Z Adventures' website, there are currently over fifteen locations that use the GPS Ranger, varying from Cedar Breaks National Monument in Utah to Key West, Florida. The device is also ADA compliant and can feature American Sign Language in lieu of text.

Figure 4: GPS Ranger and screen of the Santa Barbara Zoo (BarZ Adventures, 2005)

The accuracy of GPS is significantly compromised indoors. Since some of the NHA's locations are historic buildings, other technologies may be needed to supplement the GPS indoors.

3.4 Conclusion

Using this gathered information we created a preliminary technology matrix (Table 1) identifying key-points of each device in a comparative visual analysis. Our current matrix evaluates four types of technology against four key criteria. We have generalized the devices described above into the categories of cell phone based, iPod based, GPS based, and RFID based. Medium refers to whether the device is hardware the museum must acquire or software that can be used on a visitor's personal hardware. Wayfinding refers to the location tracking capabilities of the device. RFID based technology has limited capability in this respect, being able to only sense distance, not direction. The next criterion shows whether the device can play video. The final criterion is a summary of costs associated with the type of device, comprised of initial cost and any additional associated costs.

	Cell Phone Based	**iPod Based**	**GPS Based**	**RFID Based**
Medium	Primarily Software	Software	Hardware	Hardware
Way-finding	"Coming soon"	No	GPS	Some
Video	No	Limited	Yes	No
Price	$200 per Month plus initial costs	Initial cost	$400 per month plus initial costs	Dependent on scale

Table 1: Initial technology matrix

4 Methodology

4.1 Objectives

The overall goal of our group's project was to evaluate the desirability and feasibility of various electronic guided tour technologies and to develop and evaluate a prototype tour for the NHA using one of these technologies. To accomplish this goal of creating the iPED Tour of Nantucket, we pursued the following objectives:

(1) Identify the needs of the NHA and the requirements for the iPED Tour of Nantucket. In order to form the best recommendations for the NHA, our group needed to fully understand the NHA's reasoning for developing an automated tour. It was also important to identify the qualities of such a device that were most important to our sponsor. This included considerations of hardware versus software, overall cost, features, content, and usability.

(2) Determine what visitors desire in an electronic tour guide, and what concerns they might have with the use of it. To better understand our audience, we wished to learn how accustomed users were to certain devices, as well as what similar devices they might use and carry with them on a regular basis. We also sought to learn what content visitors would find most useful, as well as the appropriate length for tour segments.

(3) Evaluate available technologies against the requirements set forth by the NHA and the desires of their visitors to choose a technology for the prototype. Utilizing and building off our research of different technology platforms, their advantages, and disadvantages, we needed to evaluate the technologies against the NHA's criteria and decide upon a technology for the prototype in collaboration with the museum staff.

(4) Gather feedback from other museums that use technology similar to what the NHA chooses for their prototype. Museums already using products like the GPS Ranger and cell phone based tours were some of our most valuable resources. By corresponding with these organizations in preparation for, and throughout the execution of our project, we aimed to learn the common problems associated with these technologies, as well as some useful tips regarding tour creation. Our intent was to apply this information to the creation of our prototype.

(5) Conduct research into cell phone tour technology and the companies that provide it. Companies that provide cell phone tour technology to museums provided us with much of the information we required. In addition, we researched the different companies to provide the NHA with enough data to pick the best provider.

(6) Develop prototype iPED Tour of Nantucket. Using feedback and recommendations from other museums, research on the history of Nantucket, and information relating to the tour creation, our team set out to write a script in collaboration with the NHA's interpretive staff. Following the script writing phase we began recording tour segments with NHA interpreters, editing the audio, and implementing the necessary hardware and software backend for the prototype.

(7) Test prototype iPED Tour of Nantucket, to evaluate design decisions and fine-tune our recommendations to the NHA. In order to analyze the effectiveness of the iPED tour, several phases of testing were conducted. We began with self evaluations carried out by our group parallel to development. Afterwards, we utilized other project teams to evaluate the prototype test. This was followed by a trial run by willing members of the public and, testing by NHA staff. Throughout the entire process, observations and evaluations were conducted.

(8) Deliver the finished prototype and make final recommendations to the NHA. Based on what we hoped to learn while developing the prototype and throughout the phases of testing it, we established a set of recommendations for the NHA. These recommendations will detail how to start, maintain and update the tour based on our research, and should be useful in running the completed tour and advise any further development.

These objectives were established to guide our progress toward the creation and completion of the iPED Tour prototype. The methodology we established allowed us to ensure a high quality deliverable for use by the museum after our departure. It also provided a solid foundation to the NHA on which to build a complete system.

4.2 Tasks

In order to accomplish the above objectives, we utilized multiple methods of data collection. These methods included activities such as role-playing as tourists, interviewing, surveying, and

prototype testing. The method we utilized was dependent on the task to be accomplished. The relation between project tasks and objectives is outlined in Table 2.

	Objectives							
Tasks	1	2	3	4	5	6	7	8
Technology Contacts		X	X		X	X		X
Sponsor Meetings	X							X
Role-Playing as Tourists		X						X
Museum Visitor Survey		X						X
Determine Technology				X		X	X	X
Prototype Development						X	X	X

Table 2: Correlation of Tasks and Objectives

4.2.1 Technology Contacts

Before arriving on the island, our group started to contact museums, historical associations and technology companies from around the United States to learn more about the electronic tours they employ and ascertain feedback on their experiences. The information gathered in this manner was the foundation for our work towards a prototype.

4.2.1.1 Company Contacts

In order to gather information regarding the different electronic tour technologies, we were also in contact with representatives from the companies that provide these guided tour technologies. During our initial investigation, we contacted with two different technology providers. The majority of the contact was with Lee Little, the founder of BarZ Adventures, the company that makes the GPS Ranger. Since the GPS Ranger is such a unique system, our contact through numerous emails with him discussed the abilities of the system, pricing questions, and other important information. We also initiated contact with Grant Lewis of Guide by Cell, a company that provides cell phone based tours to museums. Contact with this individual was limited to a few simple questions about the technology, although contact resumed later into the project.

Once we arrived on the island, and the NHA decided upon cell phone based tours, we expanded our contacts to include Michael Giniger from Spatial Adventures and Thomas Dunne from OnCell Systems. To gain more insight into this technology we conducted phone interviews with each of these individuals. From these interviews we were able to learn about the technology,

recommended audio recording techniques, tour setup, price structures, and other important topics. Interview questions can be found in Appendix B, and transcripts of these interviews can be found in Appendix C, Appendix D, and Appendix E.

Semi-structured interviews were conducted and recorded over the phone with willing organization representatives. We asked permission to use a speakerphone and respected any and all requests for privacy and confidentiality during these sessions, as some data was sensitive and or privileged. Interview notes were transcribed within three days. We reduced conversations to their main points by summarizing and taking key excerpts from these interviews for our results section. This allowed us to more easily comprehend how the information gathered served our purposes with the project. After the completion of the project, some records will be safely stored while others of a more sensitive nature will be carefully destroyed.

4.2.1.2 Museum Contacts

During preliminary research, our group was in contact with various individuals who use technology to provide tours for their customers. One such individual was Terrence Winschel of Vicksburg National Military Park. This national park utilizes the GPS Ranger system from BarZ Adventures, and was able to provide insight into the system. Another useful pair of contacts was Tom and Nancy Condon from a company called Nature Pods, who provide tours using iPod technology. These individuals were able to provide information on the iPod touring technology.

After the scope of the project narrowed to focus on cell phone technology, we expanded our contacts to include museum that utilize cell phone based tours. These contacts include Steven Rector from Valley Forge National Historical Park, which utilizes a tour from Guide by Cell. In addition, we were in contact with Amy Schlegel from Tufts University Art Gallery, a user of a Spatial Adventures tour. We also contacted Sue Moynihan of the Cape Cod National Park due to their use of an OnCell System tour. We also attempted to contact other users including other national parks, the New York State Parks, and others who did not to get back to us.

In order to acquire the experience that these organizations obtained by developing guided tours of their own, we interviewed these individuals as representatives of their respective organizations. These interviews allowed us to discover more information about cell phone based

tours from users, and their opinions of the technology. Further details regarding key topics we discussed with them can be found in Appendix F.

Since we only had a limited number of questions, and desired detail on topics that these individuals were most likely not used to discussing, we decided to conduct email interviews. Once we were in contact with a representative from the organizations, we sent out an email that included the questions we would like answered, and told them to respond at their leisure. The questions asked along with the responses can be found in Appendix G, Appendix H, and Appendix I.

4.2.2 Sponsor Meetings

During our time on the island, we conducted and attended multiple meetings with our sponsor. Our first few meetings were especially important for getting the project moving in the proper direction.

The initial meeting was our proposal presentation to the NHA on October 27th. This served as a means of introducing ourselves and helped in opening lines of communication for further meetings. On this first day we met our project liaison, Dr. William Tramposch, who is the organization's director. We were also introduced to Ms. Kim McCray, the director of Interpretation and Education, and Mr. Erik Ingmundson, the Senior Interpreter; both of these individuals were important contacts and sources of guidance throughout the course of the project.

Soon after we scheduled a meeting with our sponsor for Wednesday October 29th, which allowed us to better introduce ourselves to Dr. Tramposch, Ms. McCray, and Mr. Ingmundson. We also took the first steps towards clarifying and establishing a direction for the project, using the list of topics in Appendix J as a script. In particular we discovered that the idea of the iPED tour had been existent for some time, and that the wayfinding aspect of it was in response to the ReMain Nantucket initiative that found navigating the downtown area was problematic. We also took this opportunity to gather feedback on the visitor survey we were planning to administer over the coming weekend. Mr. Ingmundson was particularly helpful as we revised and readied our questionnaire. The transcript for this meeting can be found in Appendix K.

On Thursday October 30th during our first week on the island, we presented a condensed version of our proposal presentation for the Nantucket REDs, a group of local business and organizational leaders. This meeting provided us with some different perspectives on the iPED Tour in the community and framed the project and prototype as the foundation of a service that might someday expand beyond just the NHA to the entire Nantucket community.

The following Wednesday, November 5th we met with the NHA's interpretive staff, again presenting a condensed version of our proposal presentation. Like our meeting with the Nantucket REDs, this was used as an opportunity to learn and better understand different perspectives on the project.

Wednesdays were also established as the date of our weekly meeting with our sponsor and project advisor. The first weekly meeting gave us an opportunity to present our survey findings to the key members of the NHA staff introduced above. This meeting and our survey results clearly established the technology best suited for the prototype. We also laid the foundation for the script writing and prototype development phase of the project, which began shortly after.

4.2.3 Role-playing as Tourists

Role-playing as tourists, although not a common method of data collection, was very useful and applicable to this project. The thought behind role-playing as tourists is that if you experience a place as a tourist, you can get an unbiased perception of what tourists would want in a tour. The fact that none of our group had ever been to Nantucket before was both an advantage and a disadvantage. As first time visitors to Nantucket we were able to tour the island initially without any preconceptions or navigational experience. This allowed us to better analyze what technology would be most practical, and determine how to best conduct a tour. This exercise also helped us better understand how to supplement the current interpretive techniques used by the NHA, by familiarizing ourselves with the island and the museum. During our tour with NHA interpreter Karen MacNab, we were able to determine the amount of material presented at each site, and reflect upon the best way to present it in an electronic tour. Role-playing as tourists also allowed us to get a sense of the walking distance between the sites, the ease of navigating through the downtown area, and the cell phone coverage at all locations.

4.2.4 Museum Visitor Survey

To determine in a broader sense the opinions and feelings of potential users of the iPED tour, we used surveys to collect data from visitors to the NHA and the island of Nantucket during the weekend of November 1st. The survey consisted of questions that ascertained the interest, expectations, and desired medium for an electronic tour. (See Appendix L for a copy of the survey).

In order to collect the most accurate data, eliminate bias from our questions, and clarify confusing or wrongly worded questions, we pretested and refined the survey using various individuals. After developing an initial set of questions, our group, with the assistance of our project advisor, ensured that each question was worded in an understandable way in addition to being able to produce understandable and useful results. After meeting with the NHA, additional questions were added that covered topics they were interested in learning about. In order to get an understanding of how people unfamiliar with the survey would react to it, the first phase of pretesting utilized fellow Nantucket IQP students. Afterwards, the second phase of pretesting, using a survey that was modified to address issues discovered in the first phase, was administered to eight museum visitors on Friday October 31st.

Initially we planned on conducting oral surveys by randomly selecting a percentage of visitors as they left the Whaling Museum. As visitors were about to exit the museum, a group member would have approached them to ask if they would be willing to take part in a survey. The questions (listed in Appendix L) would have been asked aloud and results recorded on the survey sheet. Based on the recommendations of the NHA we decided to change the surveying location since they had previously found that many visitors are in a rush to catch a ferry as they leave the museum. They had also discovered that the entrance to the candle factory from Gosnell Hall, and the area between the scrimshaw collection and the Peter Foulger Gallery had been found to be optimum locations due to the flow of visitors through the museum. We also discovered during the second phase of testing that conducting the survey orally presented issues due to a question that asked participants to rank a list of items. We faced difficulty in reciting the list of items in a non-leading manner and showing them the list instead became a balancing act of the list, and the other sample materials. Due to this issue and our desire to survey as many guests as possible in a

short period of time, we decided to change our strategy and distribute paper surveys to visitors instead of asking the questions verbally.

Based on those discoveries, we conducted surveying on the weekend of November 1st and 2nd along with the following Monday the 3rd. The surveying was conducted in the area around the entrance to the candle factory from Gosnell Hall on the recommendation of the NHA. Due to the limited number of visitors to the museum during the off-season, we attempted to approach all individuals and groups, introducing ourselves and the project, and asking whether they would be willing to take a short anonymous survey for the purpose of improving the NHA's programs. Following completion, surveys were collected and stored for later analysis.

In order to gain useful information from the surveys for data analysis, survey results were entered into an Excel spreadsheet. From this we were able to collate the numbers and create charts and graphs based on the data (which are available in Appendix M and Appendix N). Extensive explanation of these results can be found in the Results and Analysis section.

4.2.4.1 NHA Member Survey

We had initially planned on the possibility of conducting surveys of NHA members through mailings or electronic distribution to utilize the valuable information they possess. This however was deemed unnecessary due to our modified timetable when the NHA quickly settled on a desirable technology.

4.2.5 Determine Technology

Once all of the data was collected and input into an Excel sheet to properly display the data, we updated our technology matrix to provide an up-to-date graphical representation to the NHA. The original matrix, as seen in our Literature Review on page 22, sorted the technologies on medium (hardware or software), wayfinding capability, video capability, and estimated post-production cost. To update this matrix, we added in the survey results, an ease of use category, and renamed some of the original categories. In the new version all of the technologies were given a score for each category, and each category was weighted. This process is detailed in the Results & Analysis section.

This matrix took into account the desires of the NHA, their visitors, and the abilities of the various available technologies. Based on this we made our recommendation to the NHA that cell

phone technology would best suit their application. The main support for cell phone technology came from its high acceptance rate by the guests surveyed and its low cost to the NHA. Additionally, this technology utilizes guests' own devices, meaning the NHA does not have to maintain hardware.

4.2.6 Prototype Development

Since the cell phone based tour technology was determined by the second week on the island, we began to develop the prototype tour for the NHA, beginning this phase earlier than originally planned. We had initially thought that a script would be provided to use for the tour; however, we discovered that this was not the case and that the NHA expected us to work with the interpretive staff to write a new tour-specific script using their historic resources. Despite Dr Tramposch's hopes that we would be able to provide a tour of all the NHA's sites, we began by writing scripts for the nine key sites of our prototype: the Fire Hose-Cart House, Greater Light, Old Gaol, Hadwen House, Quaker Meeting House, NHA Research Library, Macy-Christian House, Old Mill, and Oldest House.

Utilizing some of the many historic resources, we were able to develop scripts. The main resource for all of the scripts was the *Properties of the Nantucket Historical Society* book, which was written to describe the main sites for members. Using that book as a base, additional information from both the NHA's website and binders filled with primary source material were added to the scripts to provide more detail and reinforce our understanding of the history involved. While writing the scripts we tried to keep their length less than ninety seconds, following suggestions from other museum contacts.

Once we finished writing the scripts, they were sent to Ms. McCray and Mr. Ingmundson for review to check for historical accuracy and to improve them any way they could. After they finished reviewing the scripts, they sent them to the interpretative staff for additional review. The final version of these scripts can be found in Appendix O.

After revision of these scripts, we began recording the initial audio segments to be used in the tour. Audio recording of the site scripts took place on December 3rd, 4th, 12th, and 15th. The recordings were conducted in the conference room of the NHA's administrative offices. The conference room was decided upon due to its low volume of airflow from the ventilation system,

and a limited amount of background noise emanating from the office environment or the operating museum above. Voice talent included Rob Matrow, Andrew Labrecque, Eric Ingmundson, and Doug Burch. These individuals were chosen by their availability to record the scripts and the ability to speak loudly, audibly and their recording quality.

Multiple microphones available to the group were tested to ensure the best audio quality for playback over a cell phone. The microphone chosen was a lavalier style Sony ECM-C115 condenser microphone owned by the NHA. The microphone was attached to a MacBook laptop through the line-in port. The software used to record the segments was Audacity version 1.3.5d, a free open source, multi-platform audio editing software package.

After recording the audio segments, the original recording files were compressed to form an archive as a fallback if the original recordings were needed. The main files were then edited using the software package. Since the audio recordings started slightly before the voice talent started reading the script, and were stopped after he or she was finished reading them, the files were cropped. The audio segments were also edited to remove parts of the recording that included spoken errors by the voice talent and occasional background noise that could be heard when the speaker was paused.

To ensure the best sound quality, two audio effects were applied to the entire segment. First, the "Leveller" effect was applied with the default "moderate" degree of leveling and the threshold of noise set to "-70dB." This effect created an even volume throughout the length of the segment and eliminated some of the background hiss, hum, and ambient noise. Next, the "Normalize" effect was applied with the max amplitude set to "0.0dB." This effect was used to increase the amplitude of the segment to the maximum without distorting the audio, allowing for a louder audio file.

Once the editing was done, the files were exported as AIFF files for archival purposes in case the audio files are needed for another use. An AIFF file is a standardized uncompressed and lossless audio format that although large in size, does not have any loss in quality. The files were then exported as MP3 files, a standardized compressed and lossy file format that creates a smaller file size at the cost of some audio quality. These MP3 files were then uploaded to the OnCell tour through a web interface, and linked to the different tour stops.

All three cell phone tour providers we were in contact with offered a free trial period. Since the NHA was only interested in understanding the development process, we developed the prototype using a trial offered by OnCell System. During a phone call with Thomas Dunne of OnCell, we received a free 45 day trial of their product for our group. Upon completion of a five-site prototype, we began the testing process.

4.2.7 Prototype Testing

Prototype testing was utilized to aid in the analysis of the prototype, providing us with feedback on the cell phone tour functionality, its interface, and content.

In order to test the tour, we needed to develop a handout that would allow visitors to take part in the tour. The handout consisted of a map and a brief set of instructions to get participants started on the tour. Using a scanned image of the map used in the *Properties of the Nantucket Historical Association* book, we used an image-editing program to transform it, making it suitable for the tour by changing the colors, adding in the site locations, and overlaying text for the instructions. The final version of the map and instructions can be found in Appendix P

In order to ascertain the opinions of testers, a survey that accompanied the map was created. The survey, as found in Appendix Q, asked about users' opinions of the experience, the tour content, the technical parts of the tour, and left space for comments.

To save paper, and to make it easier for guests to use, the map was printed on cardstock, two to a page, and the survey was included on the back of each.

We had always expected that the selection of visitors to test the prototype would be dependent on their availability during the off-season. It was determined that prototype testing groups should not last very long because they needed to be short enough that people are willing to take time out of their days to participate. Also we decided to keep the route of the tour minimal and centered around the Main Street area, since other activities were going on at the time, and it was very cold out.

The Friday of Christmas Stroll, December 5th, along with the morning of December 13th, was spent testing the prototype with other WPI IQP students and our project advisor, who were in many ways tourists, and would serve as viable testers of the prototype. The willing participants

were asked to come to the Whaling Museum, where we met them and distributed the handout containing the map and directions, along with the survey. Visitors were informed that following the session they would be asked to complete a brief questionnaire about their experience with the device. The session involved actual hands on interaction that simulated actual usage in every aspect with the exception of a full catalog of sites. We instructed them that the tour was intended to be self-guided, and that we were just there to observe and would not provide instructions or let them know if they got lost. The reason we conducted the tour in this manner was to ascertain if the map and instructions had any flaws, and to test how difficult it was to navigate to and locate all of the historic sites. The tour, whose route can be seen in Appendix R, started at the Whaling Museum, went down South Water Street, and progressed towards the first stop, the Quaker Meeting House and Research Library. From there the tour progressed to the Macy-Christian House. Next, it moved back to Main Street towards the Hadwen House & The Three Bricks.

During the length of the tour, we took notes on how the group navigated with the map, their ease (or lack of ease) identifying of all the buildings, all the comments spoken about the tour, and anything else we felt was relevant. At the end of the tour, the participants were asked to fill out the survey on the back of their handout. We also started an informal discussion of the tour to discover how the group felt about it in greater detail than the survey could convey. Once they completed the survey, we thanked them, and ended the session.

Locating tourists who would be willing to take part in our walking tour was difficult at the time of year we were on Nantucket, since almost all of the tourists had returned to the mainland weeks, if not months ago. Since our group's prototype evaluations coincided with the Christmas Stroll, we thought it would be easier to find guest willing to participate at this time, than compared to other times during the winter. The Christmas Stroll takes place from Friday through Sunday, and consists of hundreds of lit Christmas trees on the streets, large discounts in the local shops, and numerous other festive activities. Since this event draws a large number of tourists and summer residents back to the island we felt this was the best time for testing. The possibility of compensating guests for participation was considered and those who participated in testing the tour were provided with a gift certificate for the Museum Gift Shop along with membership materials.

Testing of the iPED Tour prototype with Museum guests took place on the weekend of December 6th. We set up a table in the foyer of the Whaling Museum to advertise the tour. We distributed the handout that included the map card and survey to allow visitors to take a self-guided tour, and return the completed survey later. We also attempted to attract groups of visitors willing to participate in a group test of the tour around town, where we would follow them and take notes on our observations (like we did with the earlier group) and discuss the tour briefly with them afterwards. Given the fact that the Museum's other interpretive programs were on hold (due to the NHA's Festival of Trees and the Christmas Stroll) we hoped to be able to attract tour groups of up to ten to depart on an hourly basis. We quickly discovered, however, that these events would have the opposite effect on participation.

Due to the "nature of the weekend," we were unfortunately unable to conduct any group tours, and the handouts for the self guided tours resulted in a good number of calls to the Whaling Museum stop, a few calls to other sites, and most unfortunately no completed surveys. (E. Ingmundson, personal communication, October 29, 2008). The reasons behind this are detailed in the results and analysis section.

Since little data was collected from visitors, other groups of people were asked to take part in the tour to provide additional feedback. These groups included NHA staff and local Nantucket residents that we were able to contact. Although these individuals could not provide the same type of results as visitors, since they were already familiar with the history and navigation around the island, they were the only people left, and provided good feedback.

The first group of locals that took part in the tour resulted from assistance by another Nantucket IQP group. During a conversation with their sponsor this group mentioned our lack of data, and the sponsor offered take the tour and fill out the survey and was also kind enough to forward it to other residents she knew. We also used the Alumni Luncheon as an opportunity to distribute more of the tour maps. Surveys from these individuals slowly came back to us through emails.

In addition, following one of our sponsor meetings, the map and survey were forwarded to the NHA staff. In hopes that it would foster greater results and willingness to participate, we made the actual touring optional, asking the staff to simply listen to the audio segments. This provided

us with valuable information on the user interface and scripts, while avoiding the task of locating sites which many staff members were already quite familiar with.

Due to time constraints, we set the evening of Saturday December 13th as the cutoff for all surveys, so that the results could be sufficiently analyzed. Due to the relative lack of results and ideal participants, the data had limited utility. The multiple-choice responses were entered into an Excel spreadsheet, and graphed. From these graphs, limited conclusions were made. In addition to these graphed results, the comments and written in responses were collated, and used to form recommendations

4.3 Conclusion

Based on the results of our prototype testing and exit survey, the feedback we gathered from other museums, as well as the data gathered from the museum staff and visitors, we worked to compile a final recommendation to the NHA. In our final presentation, we showed our updated results and explained what progress we made towards the ultimate goal of the complete prototype tour. We also recommended that the NHA continue with the cell phone based tour technology, citing the successful prototyping.

In summary, the data collected by our project includes the data collected from museum visitors during the weekend of November 1st, which was analyzed and considered using standard statistical data techniques to determine the best type of technology for the iPED Tour of Nantucket. Further data was gathered on each of the three cell phone tour providers—both from them and their users—to evaluate and compare each. Cost and feature comparison tables were used to interpret this data. Surveying and observation of prototype testers was also collected and analyzed to form recommendations for the NHA's further continuation on the iPED Tour of Nantucket.

Since the aforementioned tasks were completed within our seven week window of opportunity, we outlined a timeline depicting our progress, as seen in

Figure 5.

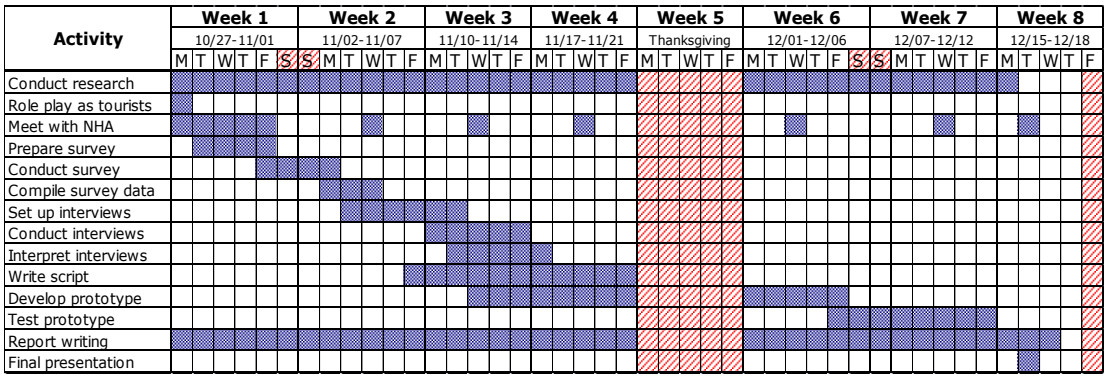


Figure 5: Project Timeline

5 Results and Analysis

5.1 Visitor Survey Results

On the weekend of November 1st and the following Monday the 3rd, we conducted surveys with visitors to the Nantucket Historical Association (NHA) Whaling Museum, a copy of which can be found in Appendix L. Over those three days we conducted a total of 61 surveys from the museum's total of 169 visitors. This level of visitation is considerably lower, and made up of a slightly different population than what the museum sees during the peak summer season. According to E. Ingmundson (personal communication, October 29, 2008) the NHA "can see upwards of 900 visitors a day" during the summer months. NHA staff also noted that visitors to the museum during the off-season were comprised of fewer tourists, and more of the older demographic.

These differences in visitation play a part in the accuracy of our results. Since the tour will be used primarily during the summer, the feedback we received from the winter population might differ from that of the summer population. This is important because the older population would most likely have different technology views than a younger one.

The sample size that we were able to gather for the survey was limited to the number of visitors going through the museum that day. Therefore, the conclusions we have drawn from that data may not be as accurate to the full population as we would have preferred. Another possible source of error, stemming from the population surveyed, was attributable to the prevalence of group visitation. Some groups and couples filled out a single survey together, while other groups were represented by multiple surveys. This resulted in some groups being represented differently than others. Groups also caused misrepresentation in our data whenever one member chose not to complete a survey on the basis that a member of their group had already completed one. Group members would also opt out of the survey for fear that they would slow down their group by taking it. Another common reason for individuals not to participate in the survey was for catching a scheduled ferry back to the mainland. These visitors saw their time at the museum as limited and likely wished to spend their time exploring (not writing). While a visitor with a deadline to catch a boat might better represent a summer visitor, they also might be the type of person who would not be willing to take part in a tour because of their lack of available time.

Once the raw data (see Appendices R-2 and R-3) was collected, we compiled and drew conclusions from the resulting numbers. Of the visitors we surveyed, 64% were first time visitors to the NHA Whaling Museum, 28% had visited before, and the final 8% were NHA members who had also visited before. These numbers can be seen in Figure 6 below.

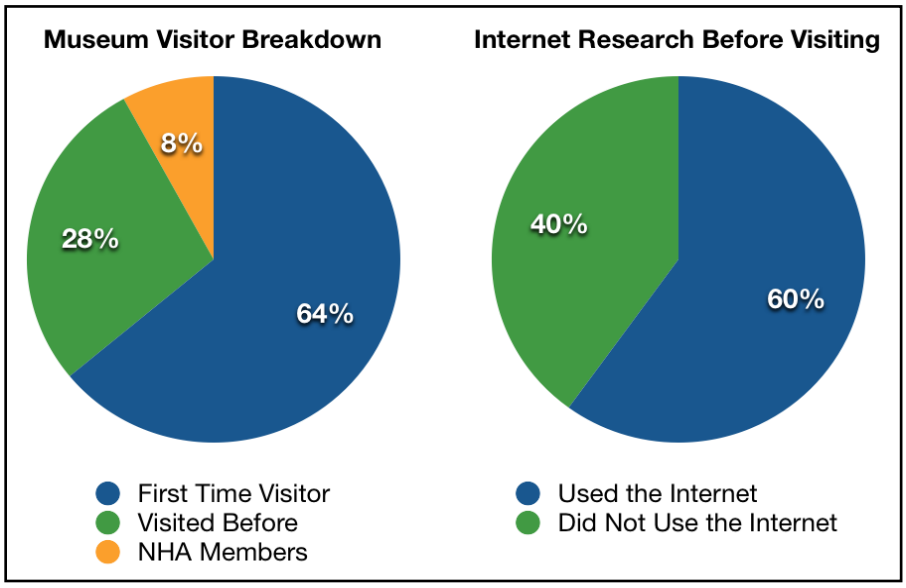


Figure 6: Museum patronage and Guest use of Internet

Of the visitors surveyed, 60% used the Internet to learn about Nantucket, as seen in Figure 6 above. This is an important statistic to know, especially when considering iPod and MP3 technology. Visitors who use the Internet to learn about their destination would be more likely to learn of such a tour and could better plan to take part in it by bringing the necessary hardware with them preloaded with the content. This is significant when considering an iPod-based tour, since visitors would be required to load the tour onto their device before coming to the museum. This must be done from their own computer since some devices contain software that links the player with a single computer or account to prevent unauthorized sharing of copyrighted music files.

Another part of the survey studied iPods and MP3 players as a potential tour technology. As shown in Figure 7 below, 66% of visitors owned an iPod or other MP3 player. Of those who owned one, 62% had the ability to display video while the other 38% could not (or did not know if they could). That shows that just over 40% of visitors owned a device that could be used to

display a tour featuring video. The results also show that 50% of all visitors surveyed owned an iPod or MP3 player and would be interested in using it to take a tour of Nantucket.

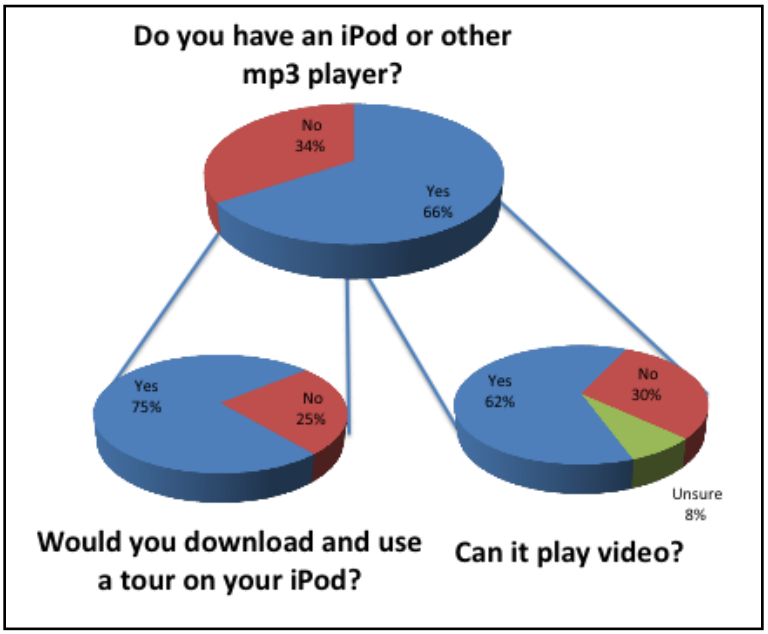


Figure 7: iPod related survey results

Additionally, the survey found that people would be interested in renting a device that features GPS. Of the guests surveyed, 75% thought that they would rent such a device if it were available to them. Results also showed that the average maximum fee visitors would be willing to pay for the rental was $12.80. The mode cost came to $10. While the positive response to this question was high, the fact that this question describes a device that people were not familiar with has to be taken into consideration.

The survey data also provided insight into cell phones as a medium of providing tours. Of the visitors that we surveyed, 89% were carrying a cell phone with them at the time, and 74% of those who were carrying one would have been willing to use it for touring. The resulting figure shows that 66% of museum visitors would be willing and able to take part in a cell phone tour. The results also showed that cell phone reception did not appear to be a problem, since the average reception was rated 4 out of 5. Further investigation of cell phone reception was performed for confirmation of this.

In addition to technology questions, visitors were also asked about their thoughts on the content of the tour. The question asked them to rank the top three topics they were interested in learning about, including directions between sites, local attractions, historic events, historic sites, historic individuals, and Nantucket legends. As shown in Figure 8, historic sites was the clear first choice of visitors, with local attractions, historic events, and Nantucket legends coming in close behind. When the second and third choices are added in, historic sites and events are shown to be most important, with the rest falling behind.

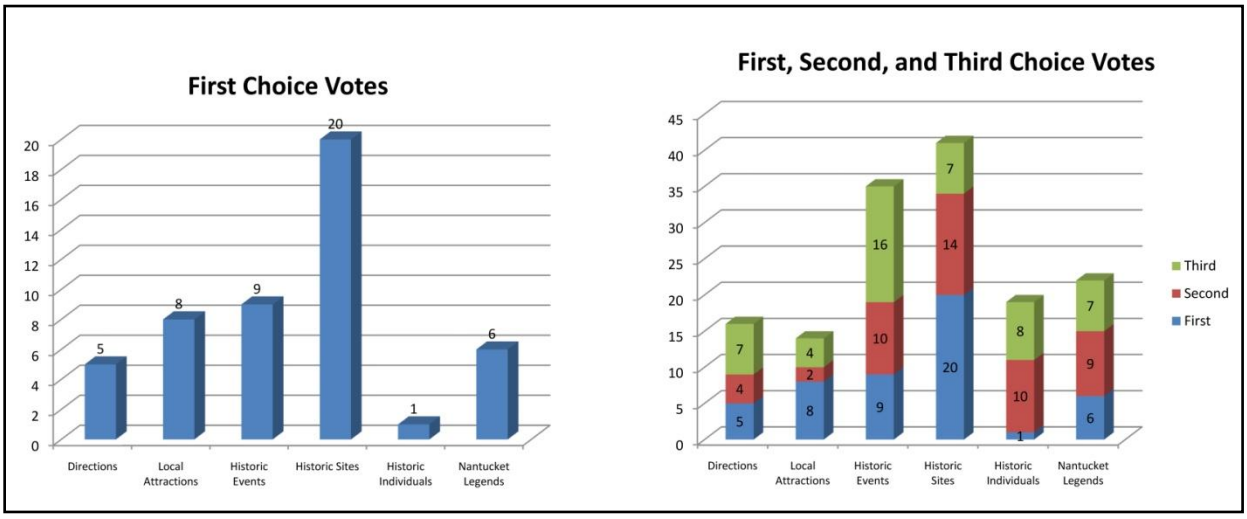


Figure 8: Guest preference of tour content

The survey also gathered visitor input into the length of the tour segments at each stop. Although the average length comes to seven minutes and twenty-two seconds, that number is not representative of the data, as shown in Figure 9. This is due to a few outliers of 60 minutes, which we can only assume came from survey takers who misunderstood the question and thought it was asking about the entire tour (since the majority of the responses were under 5 minutes). Based on the lack of a pattern to the data, we feel that the desired length of time for segments is inaccurately represented by the data. This is backed up by comments from surveyed visitors who said that the length would be highly dependent on the content being presented, and that it was difficult to imagine how long a given length of time would actually seem without experiencing it.

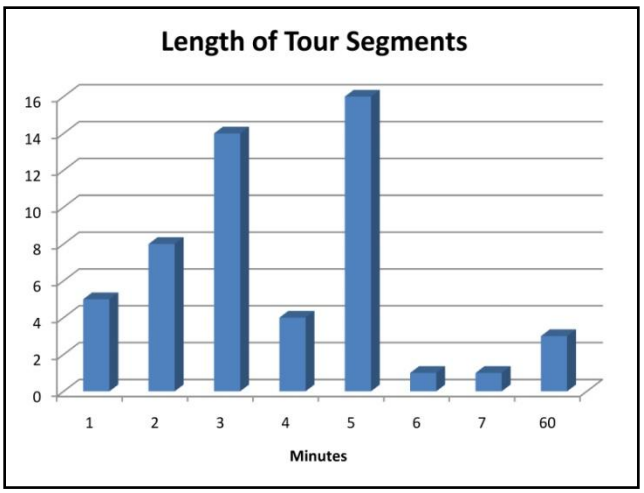


Figure 9: Guest preference of each stop length

Also included in the survey was a question that asked about other museums that offer electronic guided tours, and visitor's opinions of them. The results, which can be seen in Appendix M, did not prove to be as useful as expected. Although we were able to discover some additional museums that offered tours, none that we are aware of utilize cell phone tours, which were chosen by the NHA days after completion of the survey. The opinion section, which we had hoped would provide useful information, ended up being left blank, or contained generic comments like "informative" or "always good" most of the time.

5.2 Technology Results

Upon the completion of our background research and survey data analysis, we were able to compile information about the different forms of technology. The breakdown of this information into positive and the negative categories made it possible to recommend a technology to the NHA.

One type of technology we researched was the RFID system of location-triggered content used at the Exploratorium. From early on, we had decided to not consider this hardware based system because we doubted its wide variety of possible applications would be worth the high cost of developing a player device with an imbedded tag reader. Additionally, its location sensing abilities are quite limited, making it less desirable than GPS. Having already determined that RFID should not be recommended, we did not include RFID technology in the survey.

GPS devices, primarily the GPS Ranger by BarZ Adventures, feature satellite-based location-sensing capabilities as well as a video display. The surveys showed that seventy-five percent of guests would be willing to use this type of tour, giving it the highest acceptance rate. These positives made it seem that GPS devices would be the ideal solution for the NHA. Through correspondence with Terrence Winschel (a historian working at Vicksburg National Military Park who collaborated on the development of the GPS Ranger program there) we confirmed that other organizations have found the technology to be a useful interpretive tool. Unfortunately, this GPS technology comes at a high price. The hardware—something that the NHA had expressed a desire to avoid—would have cost approximately $X to $X initially with an additional yearly cost of $X to $X (the exact figures have been deleted from this report due to their confidential nature). From all the information, we determined that the GPS device is excellent for outside locations that benefit from high numbers of year-round visitors. Unfortunately, the NHA does not have the visitor volume to make this a feasible option.

Our research into iPod based tours yielded interesting results. This technology's negligible cost and hardware made it a very tempting choice to consider for the NHA. However, our surveys showed that it only had a fifty percent acceptance rate among guests. Additionally, our research showed that only thirty-four percent of Americans own an iPod or similar device and that most visits to museums are impromptu, lacking the foresight needed to download the tour and pack a player before traveling to their destination (Madden, 2008). These potential problems, the difficulty in content distribution due to licensing restrictions, and a lack of location-sensing features made iPod based tours less appealing for the NHA's use as a primary technology. The possibility of offering it as a second option for guests was considered.

The final type of technology was cell-phone based audio-tours. These tours are provided by OnCell Systems, Guide-by-Cell, Spatial Adventures, Museum 411, and other similar companies to hundreds of museums, national parks, historic towns, and landmarks throughout the United States. The surveys showed that sixty-six percent of guests were accepting of this type of tour technology, overlooking its lack of video and location-sensing capabilities. Also, cell phones were owned by 90% of guests surveyed, making this the most accessible touring method to users. This result is close to a figure from our research, which states that 95% of people surveyed in the United States own cell phones (Kim et al, 2008). With a cost of approximately $200 per

month, the availability of free trials of the software, and the future possibility of the NHA hosting the technology themselves, cell phone based tours were the most appealing solution for the NHA.

5.3 Technology Analysis

This is a recap and summarization of our technology research and survey information. RFID should not be considered because it is too expensive and difficult to implement. GPS based devices have everything that the NHA desires in their tour, although they require hardware and have a very high initial and regular cost—not worth the only 75% of guests who would use one. An iPod-based tour is a compromise. It is a video-capable, non-hardware solution that comes at a low cost, but has no location-sensing abilities and accessibility to only 50% of guests. A cell-phone based tour system is also a compromise, sacrificing location-sensing capability and video for the advantage of being hardware independent, low in cost, and more highly accessible. This compromise is, from our perspective, the best solution that we can offer to the NHA.

To help identify the technology best suited for the NHA's iPED Tour of Nantucket, we created a technology matrix as seen in Table 3. This matrix judges each technology based on six characteristics, each of which were given a weight. Price was the highest weighted characteristic since it was viewed as highly important because of the NHA's limited financial resources.

Although the NHA has a significant amount of "cash or cash equivalents," they are extremely cautious about any investments and new expenditures because they are concerned with a decrease in annual contribution due to a changing economy (NHA, 2007). In addition, Kim McCray, the Director of Interpretation & Education, was involved with a failed project at the Smithsonian Institution called the SIguide, whose technology provider went out of business soon after the project started. Because of this, she is cautious to invest in technology hardware.

Ease of use, medium (i.e. hardware or software) and GPS capability were graded equally because of their importance to the tour. Ease of use is an important factor based on our literature review, which showed that people required a technology that they could learn to use in seconds and one that would become an invisible medium between the user and the information being circulated. Medium and GPS capability were important as well, due to the NHA's qualms with distributing hardware and the difficulties identified in navigating downtown Nantucket.

Survey results have a lower weight because, although important, they are limited and not indicative of the opinions of the peak season guests. Finally, video was weighted least because of concerns with guests staring down at the device instead of taking in the sites and the beauty of Nantucket. The distraction of a video device could also be a safety concern on busy streets.

After assigning weights based on the criteria above, each technology was then ranked on a scale from 1 to 10 for its score under each characteristic. Ease of use, medium, GPS, and video were ranked based on the wide range of information gathered about each particular technology. Price was based on a rough scale of 1 being the estimated price of the most expensive technology, and 10 being no cost at all. The score for survey results used the percentage of people who were willing and able to use the device divided by 10.

The total score for each technology was created by multiplying each score (1 through 10) with its characteristic's weight and summing the resulting numbers. This process found that cell phones were the optimal technology with a score of 7 out of 10, followed by iPods with a score of 6, GPS with a score of 5, and far below RFID with 2 out of 10.

Characteristic and Weight		Cell Phone	iPod	GPS	RFID
Price	40%	8	9	2	1
Ease of Use	15%	9	3	9	5
Medium	15%	9	4	3	3
GPS	15%	2	1	10	4
Video	5%	2	6	8	3
Survey Results	10%	6.6	5	7.5	N/A
Total		**7.0**	**5.6**	**5.3**	**2.4**

Table 3: Updated and weighted Technology Matrix

5.4 Selection of Cell Phone Technology

Based on all of this information, it was decided to recommend the cell-phone based technology to Dr. Tramposch, Ms. McCray, and Mr. Ingmundson. During our weekly meeting on November 5th, we discussed the findings from the survey and our research so far. We explained our technology analysis, making the suggestion that the NHA would best prosper from utilization of a cell-phone based tour. They admitted that they had been leaning towards the cell phone technology since our initial presentation, and green-lighted work towards a prototype.

It was at this same meeting when we learned that we would be expected to draft the tour script that would be used. Surprised by this unexpected new task, but determined to succeed, we discussed which sites were of highest priority, and began writing scripts for them. We then began the task of writing scripts and contacting providers and users.

5.5 Cell Phone Technology Investigation

After cell phone technology was decided upon for the iPED Tour of Nantucket, the focus of our project shifted to determining the best implementation of this technology. With multiple cell phone tour providers available, we set out to determine which would be best for the NHA in terms of features offered, price, and service. We chose four cell phone tour providers to examine: OnCell Systems, Guide by Cell, Spatial Adventures, and Museum 411. As part of our methodology we decided to speak with both representatives of these companies and representatives of their respective clients. Complete notes from these conversations can be found in Appendix C, Appendix D, Appendix E, Appendix G, Appendix H, and Appendix I.

Museum 411 did not respond to our communications until a few weeks after we initially contacted them. Since that initial response we have not received anything further from them. They have therefore been left out of our results and analysis.

5.6 Communication with Cell Phone Tour Providers

5.6.1 Features Comparison

From speaking with Thomas Dunne, CEO of OnCell Systems; Grant Lewis, a representative of Guide by Cell; and Michael Giniger, Chief Technology Officer of Spatial Adventures, we identified some of the key features of cell phone tours for use in comparison of the providers. From the features identified from each provider, we compiled a list of those most important to the NHA based upon their input. These features, as well as the completed table, are shown in Table 4.

	OnCell	Guide By Cell	Spatial Adventures
Flat Pricing Plan Option	√	Optional	√
Usage Pricing Plan Option	No	√	√
Seasonal Pricing Option	√	√	√
Pricing Structure	Number of Ports	Number of Callers	Number of Minutes
No Contract	√	√	√
Call Stats Included	√	√	√
Local Number Provided	√	√	√
Background Experience	√	√	√
Visitor Feedback Feature	√	√	√
# at Prompt Not Required	√	No	√
Record Over Phone	√	√	√
Upload Over Web	√	√	√
Custom Greetings	√	√	√
iPod Tour Support	Optional	√	√
Multiple Languages	√	√	√

Table 4: Features comparison of cell phone tour providers

Each company has various pricing options depending on the needs of the organization. Flat pricing allows the NHA to pay a specific, predetermined, price per month. The NHA can also choose to utilize a usage based pricing plan that charges a monthly fee based on how much the tour is used that month. Seasonal pricing allows for a flat pricing plan that is higher during the peak-season and lower during the off-season. The three different companies each have a distinctive way to determine the cost of a client's tour. OnCell's pricing structure is based on the

number of ports, with each port allowing for one simultaneous caller. They have reported that the plan can change seasonally. They recommend that the NHA use 5 ports during the peak season and less during the off-season. Guide by Cell charges based on the number of calls that the system sees each month. Spatial Adventures' pricing structure is similar to a consumer cell phone plan, and is based on the number of minutes used each month. They have also offered a competitive seasonal fixed rate plan to the NHA. The exact rates of each provider's plan are shown in Table 5, Table 6, and Table 7 below.

CONFIDENTIAL INFORMATION

The exact figures have been deleted from this report due to their confidential nature

Table 5: OnCell Systems pricing

CONFIDENTIAL INFORMATION

The exact figures have been deleted from this report due to their confidential nature

Table 6: Guide by Cell pricing

CONFIDENTIAL INFORMATION

The exact figures have been deleted from this report due to their confidential nature

OR

The exact figures have been deleted from this report due to their confidential nature

Table 7: Spatial Adventures pricing

One feature that all providers offer is caller statistics. These provide detailed information about users of the tour, including the city that the phone is registered to, the number of times each phone called the tour, and the length of time that each stop is listened to. Another feature offered is a visitor feedback line, which allows callers to leave comments about the tour over the phone through the system. Finally, all providers offer the ability to incorporate a custom greeting in place of a default set of instructions.

Another available feature is iPod tour support. This means that the NHA can convert their cell phone tour into a format that can be played using an iPod or other MP3 player. Although OnCell provides an automated method for converting a tour into a podcast, the ease of taking basic audio files and creating playlists makes this possible regardless of provider.

Each of the providers provides two ways to add content into the tour. The optimal method is by creating a digital sound file of the content, and then uploading it through a web portal. An optional method is to record it directly into the system over a phone.

Note that each provider offers every key feature, except for OnCell Systems, which does not offer a usage based pricing structure, and Guide by Cell, which requires the end user of the system to enter "#" after each stop number. Although not a groundbreaking enhancement, the latter was identified as an ease-of-use feature based on observations of existing tours hosted by each provider. Although each provider offers nearly identical sets of features, their implementation of each feature often differs, providing varying qualities of service between the

companies. In general, these companies stay up to date and competitive in the market for cell phone tours.

Some differences do exist in the administrative interfaces provided to the client by each provider. In all cases this interface is used for uploading content and setting up and monitoring tours. OnCell Systems provides a Google-Maps-enhanced caller identification diagram on its "dashboard" showing the origins of callers. Another difference is that Spatial Adventures requires the client to contact Spatial Adventures to "repurpose" any new content either uploaded, via the web or recorded over the phone. Repurposing, passes audio files through filters and changes the bit rate to a level more appropriate for playback over cell phone speakers. In comparison to the other two providers, this is an added step for tour setup and would prevent the NHA from updating the tour entirely independently. According to Mr. Giniger, this repurposing of content provides an advantage in sound quality. This has been difficult to confirm through observations of sample tours, as all three providers have tours of varying quality.

5.6.2 Suggestions for Implementing a Cell Phone Tour

In addition to offering an overview of their company's respective products, each representative also offered advice on the process of content and tour creation. Our research prior to arriving on Nantucket seemed to suggest that the length for each audio tour segment should be at most two minutes. This was confirmed by most of our contacts, some even suggesting that a minute and a half should be the maximum. We also received somewhat mixed advice relating to the use of sound effects and music in recordings, something that Dr. Tramposch was very interested in including to set the mood for each narration. OnCell Systems noted that while recordings with special effects worked very well when used sparingly, simple voice-only recordings received nearly identical positive listener feedback. Spatial Adventures suggested that voice and sound effects should be recorded on separate tracks, uploaded separately, and then repurposed differently than voice-only content. Guide by Cell suggested not to use any additional sound effects, suggesting that they only distract from the narration of the tour. All three providers recommended that content be recorded in a quiet place without background noise, and warned that the mono speakers of cell phones were limited in their playback capabilities.

Providers also advised us about the importance of signage for the success of a tour. Mr. Dunne of OnCell Systems noted that signage can be just as important as the tour content. Unfortunately, signage is problematic for this project because of strict regulations on the placement of signs in the historic downtown of Nantucket. For this reason, we decided to provide users with a map or flyer. Mr. Dunne warned against this decision, saying that while they will not destroy the tour, they may result in decreased visitation. This is due to the fact that users would have to obtain the map before utilizing the service, which removes the benefits of coming across a sign advertising the tour and dialing in on the fly. To remedy this, Mr. Dunne suggested the use of temporary A-frame signs (in addition to flyers) for guiding and attracting visitors.

Given the fact that all three tour providers offer two methods for uploading or recording content, feedback was collected to help determine what method is preferred. All three providers reported that recording in a studio with a microphone yielded the best quality sound. OnCell Systems and Spatial Adventures both noted that the difference in sound quality between phoned-in content and web-uploaded content was "not striking" when compared by playback over the phone. Interestingly, OnCell Systems reported that 80% of the tours it hosts are phoned-in. This feedback confirmed our belief that there is a positive (however small) gain in sound quality when recording content "in-studio" and uploading via the web, and is why we recorded our content this way. Through this feedback and our brief experience with this method of recording, the NHA could safely use the phone-in recording option to help make any future changes to the tour, like modification of hours in a timely manner.

5.7 Communication with Cell Phone Tour Clients

5.7.1 Feedback on Providers

In addition to speaking with tour providers, we took time to contact their clients to gain feedback on service and general information about the process of tour creation. Our contacts were Sue Moynahan from Cape Cod National Park, a user of OnCell Systems; Amy Schlegel from Tufts University Art Gallery, a user of Spatial Adventures; and Steven Rector from Valley Forge National Park, a user of Guide by Cell.

Ms. Moynahan said that Cape Cod National Park chose OnCell Systems as their provider due to positive feedback received from other National Parks that utilized the company. Highlighted

were the call-tracking features and the feedback line built into the system. She also noted that the, "OnCell staff are available and easy to work with" and even allowed "more ports to accommodate… callers in summer" and "fluctuations in visitation." OnCell has subsequently offered a similar accommodation to the NHA.

Amy Schlegel reported that Spatial Adventures was chosen for the Tufts University Art Gallery Tour based on its affordability, small size, and "good customer service." She reported having had no issues with the service since adopting it.

Steven Rector from Valley Forge National Park said that his organization chose Guide by Cell as their tour provider due primarily to its availability at the time when the tour was being set up. He stated "some of the companies wanted [Valley Forge] to use professional voice talent and script writers and have a tour that would have been very difficult to update and evolve" but with Guide by Cell this was not the case. In addition to great customer service, Rector highlighted the by-volume pricing structure as an important aspect for his organization, which sees drastic variations in visitation. In addition, Guide by Cell's service has come with little to no "outages or problems" for Valley Forge. In general visitors have enjoyed the tour, particularly its open-endedness and portability.

In addition to the features comparison performed above, feedback from museums shows that there are no major differences in customer satisfaction between the three providers. What is important is that the different organizations chose their respective providers for different reasons, and no two organizations used the same criteria for evaluating available providers.

During our research of tour providers we discovered that Spatial Adventures is in the midst of litigation with another company called NSG Datacom. NSG Datacom filed the suit on November 6th 2008, and the nature of the suit is listed as "Torts - Property - Other Fraud" (Justia, 2008). The details of the case are not known to us; however, the expenses of a court battle could be detrimental to a small company like Spatial Adventures and their clients. This point must be taken into account.

5.7.2 Suggestions for Implementing a Cell Phone Tour

Sue Moynahan (Cape Cod National Park), Amy Schlegel (Tufts University Art Gallery), and Steven Rector (Valley Forge National Park) also provided us with useful recommendations on the process of creating the prototype tour for the NHA. Having been instrumental in crafting tours for their respective institutions, this feedback was welcome and highly useful.

Ms Moynahan recommended five questions to consider when planning stops on the tour. They are as follows:

1. Is there good, reliable cell coverage at the location?
2. What is the compelling story at this location? What will people want to know about the spot, and how can it be made interesting to listeners?
3. Can we tell the story in about ninety seconds?
4. Who should do the narration? Some voices have good sound quality; others not so good.
5. How will we accommodate visitors who have hearing difficulties?

Many of these questions were already in our methodology for tour creation, yet this confirmed that our methods were in fact valid. Results on cell phone reception at each of the NHA's historic sites follow this section. As mentioned above, the maximum time for each tour segment is an undisputed two minutes or less. Additionally, the voice talent for our narrations will likely come from the NHA's interpretive staff, or from individuals with distinctive voices that will capture listener attention (possibly Patrick Stewart).

Although outside of the scope of this project, accommodations for the hearing impaired are very important to consider. Ms. Moynahan simply suggested handing out a script of the tour for the hearing impaired. Some tour providers also offer text messaging services as an additional cost.

Ms. Schlegel suggested that a cell phone tour be used as a "supplement" to existing interpretational service at a museum. Coincidentally, this is how the NHA plans to utilize their tour of downtown Nantucket—as a supplement to museum-interpreter-guided tours.

One particularly useful piece of advice came from Mr. Rector with regard to the use of maps and guidebooks in place of stationary signage. From visitor feedback at Valley Forge National Park, he noted that numbering tour stops could make visitors feel that they have to start the tour from

stop one and proceed sequentially to the end. This can be detrimental to the success of a free choice learning tour. He suggested using a numbering scheme only for a tour meant to be followed in a linear fashion. Valley Forge does this by only providing the tour stop locations on their map, and placing the stop numbers on signs at the locations. Although interesting, this would be hard for the NHA to implement due to the strict regulations set forth by the Historic District Commission.

Some other suggestions from Mr. Rector included a warning about the length of tour segments, the need to keep the length in mind when writing the scripts, the importance of advertising to increase the success of the tour, and the possibility of receiving funding from an outside grant. Valley Forge National Park received their grant from Unilever Lipton so that the program could be offered free to the public and advertised for a limited time after being launched. After a year and a half Mr. Rector said that the park was "able to get a partner group, The Friends of Valley Forge, to cover the costs of the program." According to Grant Lewis of Guide by Cell, many of his customers fund the tour through sponsorship by local companies, or take it out of their general fund.

Overall, none of the cell phone tour users we were in contact with, and almost none of the many tours we looked at, charged for their tour, something that the NHA also wishes not to do.

5.8 Phone Coverage

One major factor that needed to be considered was the cell phone reception at the different sites, to ensure a successful tour. Using information from both older and newer phones of different providers, we were able to create Table 8. This depicts the quality of cell phone service available at the NHA sites included in the tour. At this point, it is apparent that coverage is not an issue, in either the downtown or out-of-town locations since three of the four major providers, and both of the cellular technologies have no coverage issues.

	Verizon W755 (1X)	Verizon W755 (EV)	Verizon SCH-a870	AT&T LG CU515	T-Mobile Nokia
Whaling Museum	★★☆☆	★★★☆	★★★☆	★★★★★	★★★★
Hadwen House	★★★☆	★★★☆	★★★☆	★★★★★	★★★★
Greater Light	★★★☆	★★★☆	★★★★	★★★★★	★★★★
Fire Hose House	★★★☆	★★★☆	★★★☆	★★★★★	★★★★
Old Jail	★★☆☆	★★★☆	★★★☆	★★★★★	★★★★
Old Mill	★★★☆	★★★☆	★★★★	★★★★★	★★★★
Oldest House	★★★☆	★★★☆	★★★★	★★★★★	★★★★

Table 8: Reception of major cell phone carriers

5.9 Prototype Testing Results

5.9.1 Observations of Peer Testing Group One

On December 5th a number of members from other Nantucket project groups, as well as Professor Elmes, volunteered to pretest our prototype and exit survey by going on the prototype tour consisting of five sites. Although not representative of the population of visitors to Nantucket, this provided us with feedback from a key target demographic.

Some of the observations that we made of the testing group involved how well participants were able to locate the historic sites. Of the limited number of sites on the tour, the Quaker Meeting House and adjacent Research Library was the only site that caused major problems. Although the group easily found Fair Street, they had problems locating the museum. One of the issues they experienced was that they looked for Ray's Court (which was just before the Meeting House on the map), but missed it because it was a small unmarked road. The fact that there was construction was going on at the time of the tour also contributed to this difficulty. At this site, many of the group were also confused that the Research Library and Quaker Meeting House were one building, and suggested that the two be combined.

Between the Research Library and the Macy-Christian House, part of the group took an unintended detour through Judith Chase Lane, which added to the length of the tour. Although,

inconvenient, one of the testers stated that she "liked getting lost," which is in support of the concept of serendipitous discovery in our literature review, which claimed that many people enjoy the spontaneous exploration that is part of getting lost.

The testers also noted that the narration of the Research Library and Hadwen House were "difficult to listen to," and that the narrator "needs to be excited when talking." On another note, the user feedback line incorporated into the tour system might need additional explanation; one group member who utilized it experienced difficulty learning its functionality. A single participant also utilized a Bluetooth headset for part of the tour, and experienced difficulty with sound quality. Overall, the Hadwen and Macy Christian House segments were very effective at getting visitors to want to experience more.

Additional comments can be found in the survey feedback compilation in Appendix S and Appendix T.

5.9.2 Observations from Christmas Stroll Testing

On December 6th we attempted to test the prototype with visitors to the Whaling Museum. We timed this testing to coincide with the surge of visitors from the town's Christmas Stroll and the NHA's Festival of Trees with the hopes of a high turnout for testing. Unfortunately, we were unable to form groups to observe as we had during pretesting. Visitors had come to Nantucket for the two aforementioned events and while some did use the tour for some stops along the route, most were busy shopping and looking at the decorations. The cold weather was also a deterrent against spending long periods outdoors, with the tour route taking anywhere from thirty to forty minutes. We did not receive any returned surveys on this day; however, some may arrive later through the mail.

Despite the absence of observations of guests using the tour, we did get strong positive feedback on the concept of a cell phone tour from those we spoke to and provided information to. Many of these individuals would call in to stop 1, the Whaling Museum, but would go no further. This may have been due to the fact that stop 1 was only an introduction and contained no real information on the museum itself. Had more history been included in this stop, it may have enticed visitors to continue on to the Meeting House and Research Library.

There was one individual who called in to all five stops along the tour. The time between these calls seemed to suggest that he or she actually walked to the sites before calling in.

5.9.3 Observations of Peer Testing Group Two

On December 13th we recruited some remaining members of the WPI IQP group to test our prototype. The protocol for this session was identical to the one followed for the first peer testing group.

In confirmation of our suspicions, one participant expressed disappointment in the lack of information about the Whaling Museum in the introductory segment. A tester also wondered early on about the possibility of a cell phone charger or phone rental for those without their own device. While over 90% of Americans own cell phones, this is still an important question to consider.

Some members of this group walked past the Quaker Meeting House, although most did not. This increase in wayfinding accuracy might be due to the lack of traffic and construction around this section of the tour route. One participant quickly identified the NHA logo on a sign in front of the location. Some of these participants even peered through the windows of some of the sites. This level of curiosity was interpreted as positive feedback.

5.9.4 Survey Results

Of the fourteen surveys received, ten were from fellow WPI students and our project advisor. The other four surveys were emailed and handed in to us by museum staff. Based on the small number of surveys we received, as well as our relationship with the survey group, the analysis of the resulting data should be taken with a grain of salt.

From the data received, there are a few patterns that can be drawn. As seen in Figure 10 below, all of the participants enjoyed the tour, and a few even said that they enjoyed it greatly.

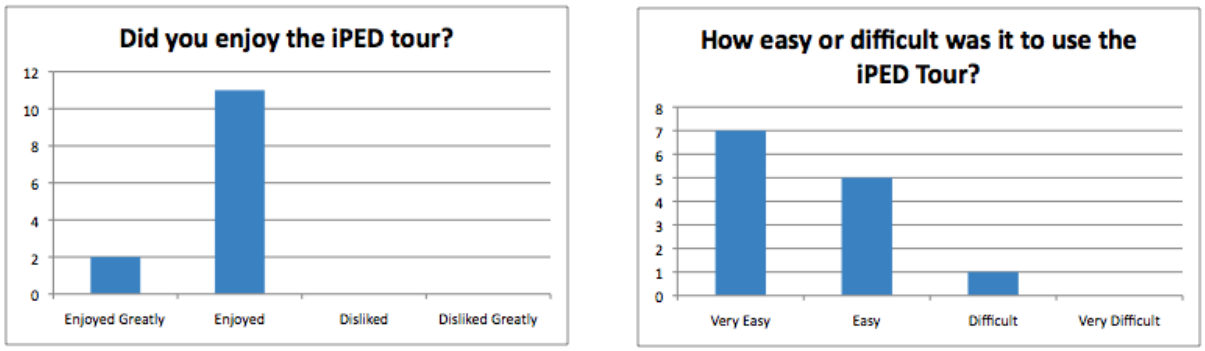


Figure 10: Prototype Enjoyment and Ease of Use for guests

The survey also found, as seen above in Figure 10 that that the iPED tour was generally easy to use with all but one person saying it was easy or very easy. The validity of this response is additionally questioned, since the population of the group is primarily young students of a school that deals greatly with technology. The results also show, as seen in Figure 11, that most people thought that the map provided was easy to use, with only two people finding it difficult. Since everyone taking the survey had navigated the streets of Nantucket for a significant amount of time prior to taking the tour, the map's clarity is hard to determine based on these responses.

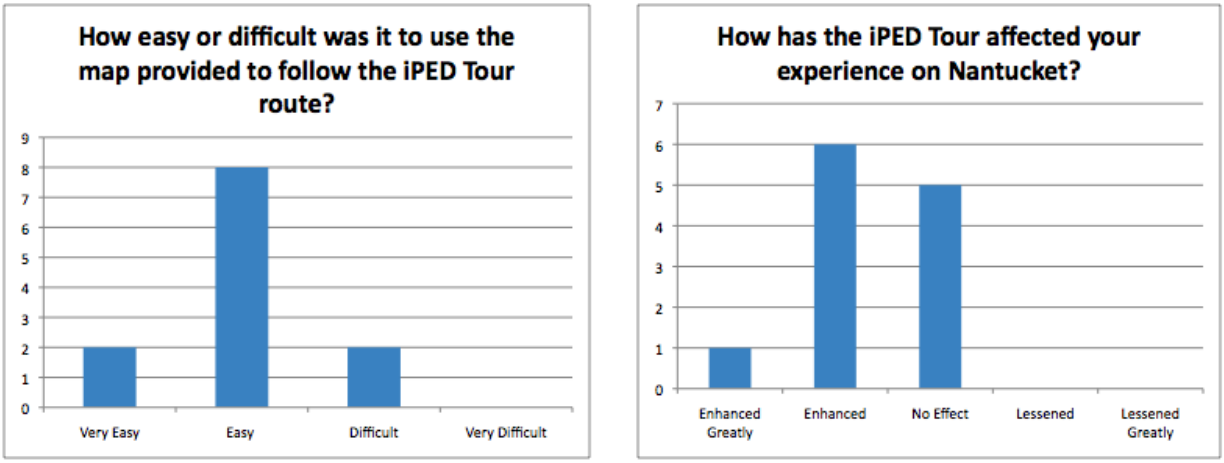


Figure 11: Navigation Statistics and Tour Experience

Also seen in Figure 11 is how the iPED tour affected each testers experience on Nantucket. The data shows that the responses are roughly split between enhanced and "no effect". The large amount of "no effect" responses is likely explained by the fact that all participants had been on Nantucket for at least a few months, making the "Nantucket experience" less applicable than it would be for a tourist. In retrospect, a more reasonable question would have been, "How has this

tour effected your experience at the NHA's historic sites?" As seen in Figure 12 below, the majority of users found that their understanding of Nantucket's history was enhanced, while many were not affected. Since some of the participants were either NHA or MMA staff, and understanding can rarely be lessened, this result has additionally limited utility.

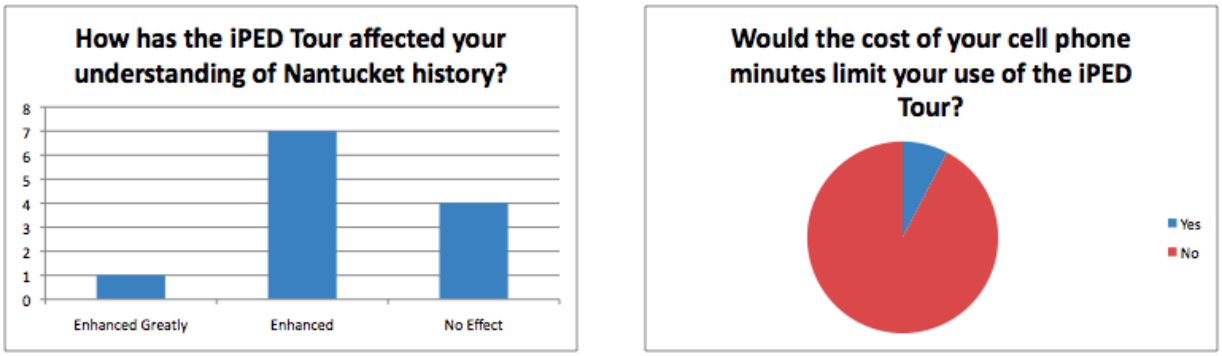


Figure 12: Historic Understanding and Cell Phone minutes as a limitation

As the pie chart in Figure 12 shows, that the large majority of participants did not mind using their cell phone minutes to take a tour, and this result is similar to what other cell phone tour users and providers have found. The survey also looked into the length of the audio segments. As seen in Figure 13 below, the result is split almost evenly between people who felt the length was about right and those who felt it was too long. Again, this result will be biased by the fact that participants either worked in a history museum, or were guilted into taking the tour in the freezing cold, and not of the same mindset of a summer tourist.

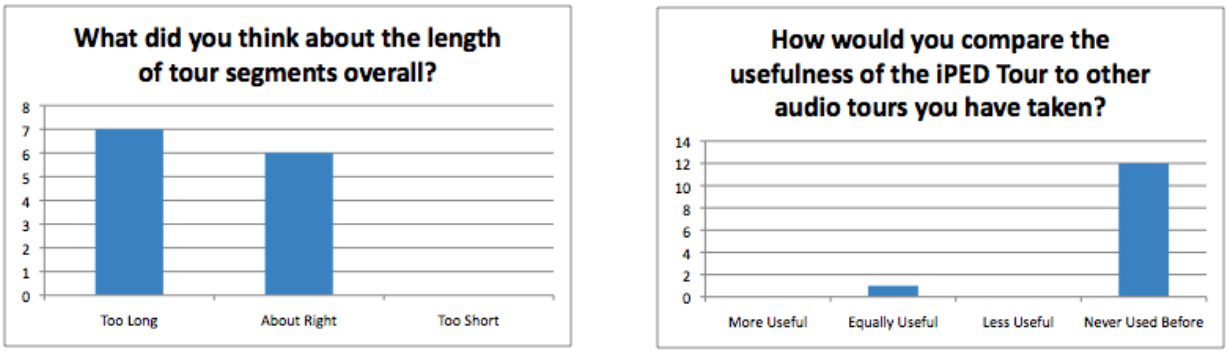


Figure 13: Segment length preference and iPED usefulness by comparison

The survey also tried to compare the usefulness of the iPED tour to other audio tours, but, as seen in Figure 13, only one person said they had ever used an audio tour. An important aspect of

a cell phone based tour is the ease of hearing what is presented through a telephone speaker. The survey found that nine people thought it was easy or very easy, and the other four had difficulty. While this percentage taken at face value is not a great breakdown, most of the individuals who found it difficult cited problems with the original recording, as opposed to technical problems, which leads us to believe that these can be solved during future audio production and editing. One minor technical problem, which was a mystery to us and OnCell Systems, was the garbled noise that occurred when some individuals called into the tour. In all cases, hanging up and calling back corrected the issue. Of the individuals who cited additional problems, responses of "quiet speaker," "background noise," and "poor sound quality" were each named once. Based on this, we feel that there is no fatal flaw to this technology. Additional written-in problems that were mentioned include "lack of enthusiasm and needs editing" and "words too fast/diction not as clear." These results are shown in Figure 14.

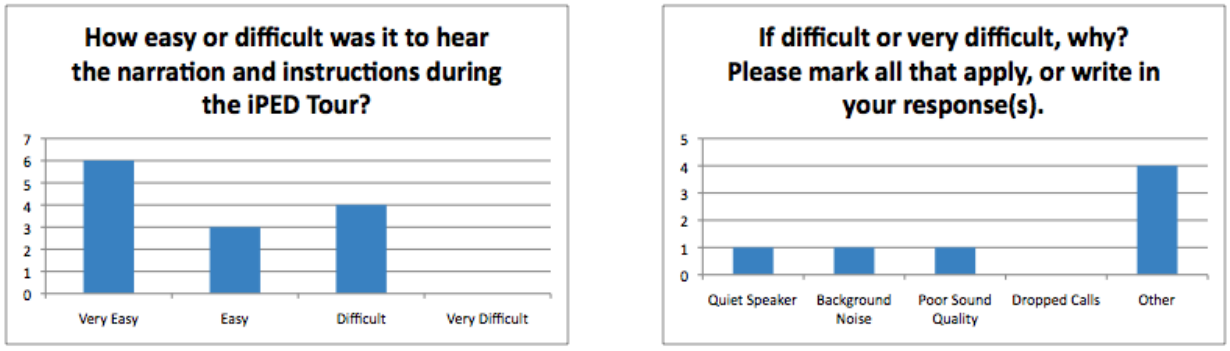


Figure 14: Guest ability to hear the recording

The general consensus, as seen in Figure 15, of participants regarding the tour is that they feel the NHA should expand it to include more of its historic sites. For reference this tour consisted of the Whaling Museum, Quaker Meeting House, Research Library, Macy-Christian House, and Hadwen House. Whether they would be interested in seeing some of the sites of limited content is unknown, but from this small sample there seems to be an interest in expanding the tour.

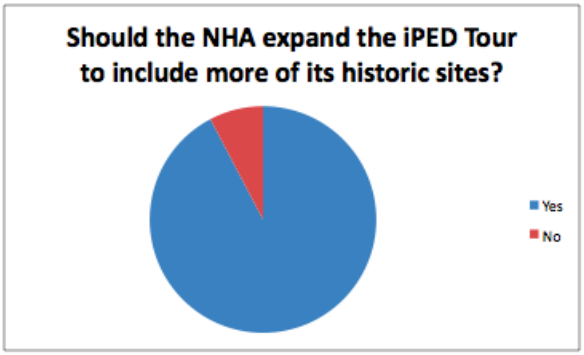


Figure 15: Guest desire for expansion of the tour

5.9.5 Caller Statistics

In addition to the surveys we collected from tour participants, we also collected data from OnCell's built in caller tracking features. This useful data listed each call into the system with a timestamp and identified how long each stop was listened to. This list was reformatted using and entered into a spreadsheet for analysis (see Appendix U for further information). As with our survey results, analysis of this data does not yield entirely conclusive results.

This data allowed us to discover the most popular NHA sites on the prototype tour. Not surprisingly, the first stop (the Whaling Museum) received the most calls. As suggested previously, the difference in numbers between this stop and the others is likely due to the lack of interesting material presented in the introduction segment for the tour. Figure 16 illustrates the number of listeners associated with each stop. The stops are, in order, the Whaling Museum, Quaker Meeting House, Research Library, Macy Christian House, and Hadwen House.

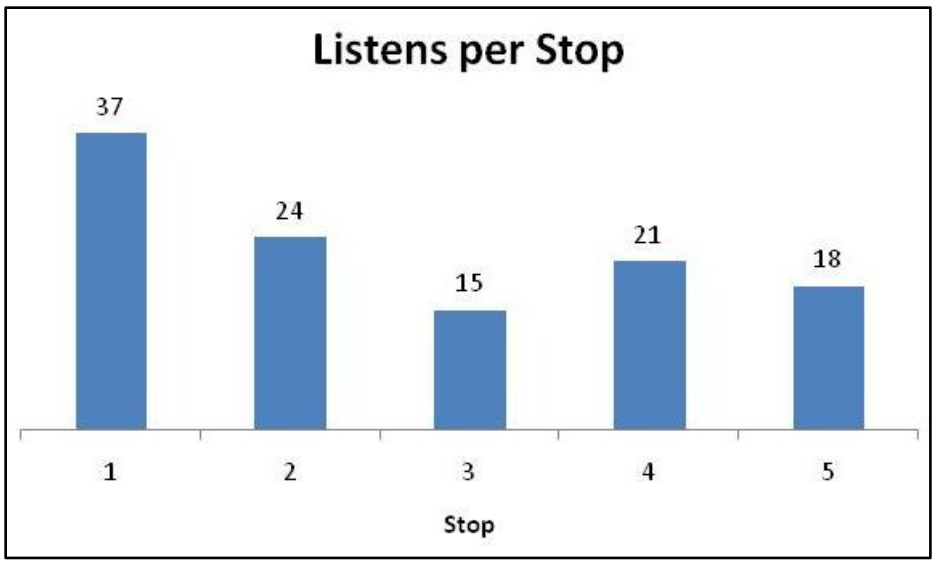


Figure 16: The number of callers who listened to each stop in the prototype.

Another important result from the caller statistics was the listener ratio analysis. This refers to the percentage of each stop segment that was listened to overall. A stop could have hundreds of callers, but if users only listen to the very beginning of the associated segment most of the information will not have been utilized. Our listener ratios were very high, although some of the callers may have felt obligated to listen to the entire tour while we observed them. Regardless, this is a key statistic to look at while evaluating the success of a tour stop. Figure 17 shows a graph of our listener ratios.

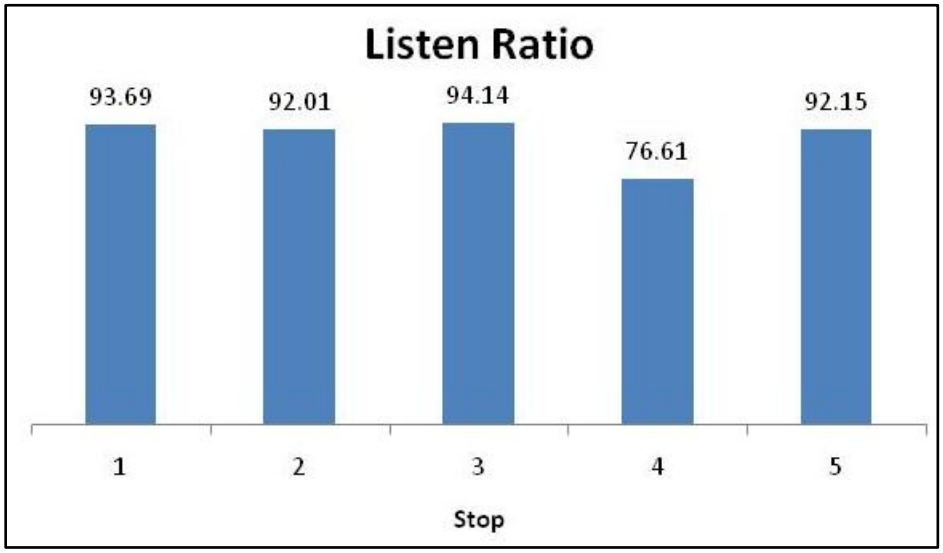


Figure 17: The percentage of each stop segment that was listened to overall.

Some useful information can be gleaned from OnCell's caller tracking output. The severe drop in the listen ratio at Stop 4 was due to the high number of abrupt hang-ups in relation to the number of overall calls. It is unknown why this occurred. While our data might not be conclusive, it suggests and confirms areas for improvement in the tour, which will be elaborated on in our conclusions and recommendations section.

6 Conclusions and Recommendations

Our time on the island of Nantucket was a unique and exciting experience. Although never leaving the state of Massachusetts, and being only a few hours from campus, the island seemed to be worlds away from home. The island's isolation from the mainland and its historic atmosphere give Nantucketers a foreign charm. The Nantucket Historical Association (NHA) has been intertwined with the town's history and life for over one hundred years, making it an integral part of the island. During the summer, the downtown is a bustle with throngs of seasonal visitors but during the off-season the town is much quieter and forms a closer-knit community. We liked this project because instead of providing the NHA with just a set of recommendations, we were also able to provide them with a physical prototype of the tour.

6.1 Conclusions

6.1.1 Technology

Based on the background research conveyed during our initial proposal presentation, our sponsor was particularly attracted to cell phone technology from the beginning. This type of tour was seen as relatively inexpensive and, according to our research, would serve as a common ubiquitous hardware platform. To reinforce this decision we surveyed a group of museum visitors during our first week on the island to ascertain the feasibility of these (and other) types of technological tour devices. Reinforced by the high percentage of visitors who carried cell phones and the high acceptance rate of the cell phone tour concept described in the survey, we were able to conclude that the cell phone platform would be best for developing the iPED Tour of Nantucket. This method would allow the NHA to provide a tour without having to manage or distribute hardware. Another deciding factor was the accessibility of the cell phone interface.

6.1.2 Tour Content and Setup

Our survey data also provided a view of what visitors want to hear in a cell phone tour of Nantucket. In our analysis, historic sites received the highest number of votes in total, as well as the highest number of first choice votes. Historic events came in a close second. The closeness of the remaining content options suggested that a combination of information on Nantucket legends, historic individuals, local attractions, and directions should be included interspersed throughout the tour as well.

While crafting the scripts for the iPED Tour prototype we aimed to keep these conclusions in mind.

Feedback from technology providers seemed to unanimously suggest the importance of signage in cell phone based tours—a point that the results from our brief prototype testing seemed to reinforce. We observed tour groups walking past many of the historic sites without realizing it, and having to backtrack in many cases to reestablish their bearings.

Having uniform, easy-to-see signage will make it much easier to locate stops along the tour. If users were told, for example, to look out for the plaque the NHA places on all of its historic buildings, tour users would have a marker to guide them to these locations. Unfortunately, these plaques often blend in with the similarly-colored structures they identify.

6.1.3 Tour Providers

Comparison of the features offered by each of the three tour providers (OnCell Systems, Guide by Cell, and Spatial Adventures) did not show any major differences in the features offered by each. The NHA can expect equal functionality from any of the companies; however, other factors may aid in deciding which is best.

6.1.3.1 OnCell Systems

From our experience with OnCell Systems through the use of their free trial, we found that their staff members are very attentive to their clients, keeping in close contact through email and regular friendly phone calls. Their attention to customer service by quickly answering any questions we had was a major benefit. They fall in the middle of the spectrum in terms of price, but are willing to offer flexible seasonal rates that seem to accurately reflect the ebb and flow of visitors to the island throughout the year.

6.1.3.2 Guide by Cell

Guide by Cell features outstanding attention to customers. As mentioned previously, they are also the most expensive of the providers we considered. Depending on the usage of the tour, the price of Guide by Cell's hosting plan can rise very quickly. Also, while very attentive to their prospective clients, Guide by Cell's sales pitch mentality seemed to err on the side of forcefulness when we were speaking with them.

6.1.3.3 Spatial Adventures

Although less expensive than OnCell, Spatial Adventures may not be the best long-term provider for the NHA due to its pending litigation. We fear that as a small company, Spatial Adventures might not survive the court battle, even if the charges against them are found to be false. If this trial is resolved, or legal research finds that there is nothing to worry about, the NHA can feel safe in working with this smaller and more personal company.

As a note, there are two other companies, Museum 411 and Cellbee, which provide cell phone tours that we are aware of. We tried to contact Museum 411, but they took two weeks to get back to us initially, and did not respond subsequently. Cellbee, who also goes by History Phone, was discovered too late in the project to contact them, and appeared to offer an inferior product.

6.1.4 Prototype Testing

Testing of the iPED Tour of Nantucket prototype was at least a partial success. We received lots of great feedback from our peers and project advisor. In general, users enjoyed the experience.

Many of the participants thought that the speed at which the narrations were spoken was too fast in some places and too slow in others. In the recording for the final prototype we sought to find a more enthusiastic and vibrant voice talent that would add clarity and a greater level of interest to the narrative, in addition to speaking at the optimal speed.

While our fellow WPI students were an excellent source of feedback for prototype testing, it is important to note that they are not representative of the NHA's wide variety of guests. These conclusions are promising and suggest that a cell phone tour is a viable option for the NHA; however, further investigation is recommended before moving forward in full.

6.2 Recommendations

6.2.1 Expanding the iPED Tour

Our research and this experience have allowed us to develop a set of final recommendations for the NHA to use if and when they choose to move forward with the full-scale iPED Tour of Nantucket. Our first recommendation is to perform a second prototype test during the spring when more accurate results can be gathered. From there the next task will be to continue using the cell phone tour as soon as they can accommodate for it, expanding it to include all of the

historic properties owned by the NHA. As part of this, we recommend that Mr. Ingmundson and Ms. McCray be the primary authors of the new sections of scripts, citing their experience and expertise in the subject matter, in addition to their editing of our prototype scripts. We hope that they will continue using and adapting the scripts that we created as well.

We suggest that the NHA consider renting inexpensive prepaid cell phones to guests who do not have a phone with them but wish to participate in the tour. The guests would rent the phone, leaving a deposit that would cover the cost of the phone and its use. In addition to this, offering a cell phone charging station could also be considered.

We advise the NHA to continue using a tour provider during the upcoming summer season as a means to judge the success and acceptance of the iPED tour during the peak season. Hopefully this will show that the iPED tour will be an outstanding success. As predicted by Dr. Tramposch, this may lead to other Nantucket organizations becoming more involved, turning the tour into an island-wide phenomenon. Should this occur, and other Nantucket organizations wish to follow the NHA's lead, we recommend that all groups work in collaboration to expand on the iPED Tour instead of creating separate and competing programs. The combined sponsorship of the community tour could help fund its growth.

Due to the small amount of additional work involved, we also recommend that the NHA consider adding an iPod tour, or podcast, as a second option in an effort to further boost guest accessibility. This would allow people who are unable or unwilling to use a cell phone tour to take part in the program. In addition, the fact that many surveyed guests used the Internet to learn about Nantucket is evidence that this content could be discovered before arriving on the island.

6.2.2 Signage

Feedback from technology providers seemed to suggest unanimously the importance of signage in cell phone based tours—a point that our brief prototype testing seemed to suggest as well. We observed tour groups walking past many of the historic sites without realizing it, then having to backtrack in many cases to reestablish their bearings. We believe that having uniform, easy-to-see signage will make it much easier to locate stops along the tour. If users were told, for example, to look out for the plaque the NHA places on all of its historic buildings, tour users would have a marker to look out for and attract them to these locations. However, the white

NHA plaques often blend in with the similar colored structure that they identify. In the absence of changing or implementing additional signage, we suggest that the NHA develop a professionally designed map or pamphlet with pictures of each location to accompany the tour. Our testing suggests that these pamphlets be small enough to fit in a pocket and not blow around in the wind.

6.2.3 Voice Talent

We would also recommend that the NHA record the scripts using an individual that has a high-quality voice. As the NHA was considering, the voice of Patrick Stewart would be a perfect fit and would also bring a celebrity draw to the tour. If that does not work out, the NHA has numerous historic interpreters whose voices would also be excellent for the tour. Doug Burch has previous experience in the field and is willing to provide his talents. Another asset to the NHA in the area of voice talent is Karen MacNab. From our first encounter with her during our guided tour of the town, we knew that she had a phenomenal talent. To increase the users' enjoyment of the segments we suggest that the orators "have fun with it." so that the audio segments do not sound scripted.

6.2.4 Tour Provider

We recommend OnCell Systems be the future tour provider for the iPED Tour of Nantucket, based on our positive experience using their trial for our prototype. From speaking with Thomas Dunne of OnCell Systems, we learned that the NHA could put a hold on the tour number and content for the time being until the NHA is prepared to offer this tour.

We do not recommend Guide by Cell based on their high cost. With Guide by Cell, the NHA would not have a fixed bill every month, but one that could vary drastically based on visitors' use of the tour. The other providers offer options with an unlimited number of calls and/or minutes.

Spatial Adventures may also be a good choice, given the low prices of their hosting plan. Further clarification on the lawsuit against the company is suggested, along with a trial of their service before seeking this alternative.

We suggest that the NHA executive staff make this a point of discussion when considering which provider to utilize. They will need to take into consideration the annual budget, the expected income of the Association for the year of implementation, and the expected usage of the system by guests. While we recommend a fixed monthly pricing structure, the NHA has a better understanding of its financial workings and patron expectations than we do. It will be in their hands to make the final decisions, but OnCell and Spatial Adventures both offer this pricing structure.

We would also suggest that the NHA consider looking into finding sponsorship for the tour to offset costs. Many other museums include a sponsorship that they feature during the introduction or on printed material. Many of the companies that are NHA business members might be interested in being mentioned in the tour. Cingular Wireless, now AT&T Wireless, is listed by the NHA as a company that has offered "corporate matching gifts" and might have an additional interest in being part of a cell phone tour (NHA, 2007). Additionally, it has previously sponsored cell phone tours offered by other institutions.

6.2.5 In-House Hosting

The NHA had expressed interest in hosting the audio tour entirely in-house to reduce cost, allow for easier expansion, and to provide a greater sense of ownership. After evaluating the popularity and success of the tour during the first season, this may turn out to be a worthwhile investment. To this end, we recommend that the NHA first discuss the possibility of hosting the system on their existing servers in collaboration with their technology advisors, Mary & Al Novissimo. We suggest that they do further research on Museum 411, which states that they provide clients with an in-house option. We have been unable to gather this information from them because of their lack of communication with us, which might in and of itself be a major reason for avoiding business with them. Before leaving we will leave some articles that may provide a good starting point for an investigation of how to set up this system.

6.2.6 Concluding Remarks and Recommendations

In final conclusion, this IQP was an overall success, meeting the needs of the sponsor organization and providing them with a launching point for the continuation of this project.

Our hope is that the NHA will continue the iPED Tour, following our recommendations and expanding it to fulfill their needs. Additionally, we feel that if the iPED Tour were to expand to a town-wide collaboration between Nantucket businesses, it would provide the seasonal visitors an excellent opportunity to learn about this vibrant and culturally rich locale. We look forward to returning to Nantucket in the future to see what progress has been made with the iPED Tour.

Appendix A Sponsor Description

The Nantucket Historical Association (NHA) was founded in 1894 when it purchased its first property—a Quaker Meeting House originally built in 1838—and turned it into its first museum. Since its beginning, the NHA has expanded its holdings to include twenty-three properties, most of which are located in the downtown area. See Figure 18 for a complete map of the NHA's historical sites and properties (NHA, 2003).

The Association's main property, the Whaling Museum, is located in a former spermaceti-candle factory built in 1847 by Richard Mitchell and Sons, and acquired by the NHA in 1929. In 2005 the NHA combined the Whaling museum with adjacent Peter Foulger Museum and extensively renovated each. The resulting building allowed the NHA to greatly expand its offerings. The Museum features a forty-six foot sperm whale skeleton, a Fresnel lens from Sankaty Lighthouse dating from 1850, the restored 1881 Nantucket town clock, and an extensive collection of scrimshaw. The Whaling Museum is the nucleus of NHA, housing the administrative offices, acting as the starting point for the current walking tours of Nantucket, and seeing roughly 55,000 yearly visitors (NHA, 2003).

The NHA also operates a research library, which provides to the public "more than 5,000 volumes and 50,000 photographs," including books, manuscripts and whaleship logs (NHA, 2008). The building was originally built by the NHA as the Fair Street Museum in 1904, and renovated in 2001 for use as a research library. In addition to its functions as research library, the building also features a gallery of changing exhibitions, and serves as a state of the art archive for the association's collection (NHA, 2008).

In addition to the Whaling Museum and Research Library, the NHA's properties include other historic buildings and locations. Guided tours of some of these sites are offered on a seasonal basis, although many of the locations are unstaffed. Some of these sites include the Quaker Meeting House, which was built as a school for Quakers in 1838, and only expanded to a meeting house in 1864. The NHA acquired the building in 1894 when Quakers had left the island, and uses it to present Quakerism to visitors. The NHA also maintains the Hadwen House, a Greek Revival mansion built for William and Eunice Hadwen in 1845 by architect Frederick

Brown Coleman. Another property is the Oldest House, which was built in 1686 by Jethro Coffin. This is the only remaining structure from the original settling of Nantucket, and features an annual sheep shearing festival. The Old Mill is another property in the NHA's collection, and is the oldest American windmill in continuous operation. Built in 1746 it operated as a gristmill until 1892, and the NHA still uses the mill to grind corn to this day. An additional site is the Old Gaol (Jail), built in 1806 at a cost equivalent to a whaleship at the time. The jail operated for 125 years and is famous for the many tales of escape that occurred during its use. Also owned by the NHA is the Fire Hose Cart House, which was built in 1886 after the devastating fire of 1846. It features "the Siasconset Pumper" along with other antique firefighting equipment, and is the last remaining cart house on the island. Another property, known as Greater Light, was originally a livestock barn when built in 1790 and was converted into a summer residence in the early 1930s for Gertrude and Hanna Monaghan, who were summer artists. The NHA offered tours of the building as it was until recent structural problems forced its closure for renovation; the NHA plans on reopening it in the coming years. Used by the NHA to provide year-round "decorative arts and crafts" programs, the 1800 House is a typical nineteenth century Nantucket house that was occupied by Jeremiah Lawrence, who was the part-time sheriff among other various professions (NHA, 2003).

The NHA exists with the intent to "preserve and interpret the history of Nantucket Island" (NHA, 2003). They hope to help the island of Nantucket to grow in the future without forgetting its 350 years of history. An important part of that history is the primary role the island played as a whaling center during the 18th and 19th centuries. To this end, the Association provides a variety of programs designed to educate and involve visitors and members of community in the history of whaling. Since its inception, the NHA has continually expanded the number of historic properties it preserves, along with its inventory of historic items and documents, while making them accessible (NHA, 2008).

The NHA is a tax exempt, nonprofit organization. They rely strictly upon donations, museum entry fees, and membership dues for revenue as they receive "no operating support from federal, state, or local government agencies" (NHA, 2008). While the goal of the Association is not to make a profit, they do take in and sustain income in order to stay in operation and grow as an organization. For example, in 2006 the association reported total expenditures of $4.4 million. Of

this, roughly $2.9 million went to programs and the rest to fundraising and administrative costs. The NHA's total average revenue over the past three years was $5.7 million, and is broken down as primary and secondary. The average primary revenue, which consists of contributions, program services, and membership revenue, totaled $3.7 million. Additionally, secondary revenue averaged $2.2 million. As of 2006 the NHA has assets totaling $30 million and a working capital of $10 million (Charity Navigator, 2006).

The NHA has a number of funding sources, the first being from membership dues. The organization provides six different levels of membership, ranging from the $55 individual membership to the $5,000 "Mary Gardner Coffin" membership. In return for these dues the NHA provides a number of "general membership benefits," and exclusive perks. Features include free admission to museums, walking tours, and access to various activities and programs. Individuals, families, and even businesses can be members of the Nantucket Historical Society. On its website, the organization lists those roughly 100 businesses that have made contributions to their cause (NHA, 2008).

Outside of collecting membership dues, the NHA makes a "yearly appeal to members and friends for contributions that help support the day-to-day operations of the association" known as the "Annual Fund" (NHA, 2003). The association collects an average of $2.8 million in donations every year (Charity Navigator, 2006).

The Association has a long-range strategic plan to utilize its financial and human capital through the promotion of "policies that enhance its programs, its collections, including properties, and its reputation" (NHA, 2008). In this long-range plan they also seek to "reach out and serve diverse audiences" with "contemporary and historical" practices (NHA, 2008). This particular goal is closely intertwined with our project, as modern interpretive techniques have a potential for attracting younger visitors to both the island and the museum. In order to continue providing these excellent services to the public, the NHA must rely upon revenue from new groups in addition to regular visitors.

The NHA had been facing difficulty in providing information to guests at some sites because of the limited number of interpreters. The iPED tour initially began as a means to correct this at the Old Jail, Quaker Meeting House, and the Fire Hose Cart House. A location-sensing capability

was decided upon because of regulations regarding the locations of signs and the resulting "lack of signage" (B. Tramposch). The NHA also wants to be at the forefront of Remain Nantucket, the local initiative involving the Urban Land Institute aiming to increase visitor awareness about the historic downtown and to protect its essential character, which saw navigational issues as a problem that needed addressing. Please refer to Figure 19 for the complete project description.

Our project is specifically oriented around the mission of the NHA, primarily focusing on the aspect of preserving and interpreting the historic sites. The tour should increase the guests' "appreciation and respect" for the island and its role in history as well as offer a new means of disseminating historical information about some of the NHA's satellite historical sites without altering any of their current services (NHA, 2008). This should allow the organization to preserve and interpret a greater number of its properties, further fulfilling these aspects of its mission statement and long-range plan.

The activities of the NHA are overseen by a twenty-five member Board of Trustees. This board includes five elected executive positions, namely President, First Vice President, Second Vice President, Treasurer and Clerk. Also, as a non-profit organization, the NHA is also always searching for volunteers and their research library has publications available for those interested (NHA, 2008).

The NHA has a nearly sixty person year-round staff headed by executive director Dr. William J. Tramposch, our current liaison. This staff is distributed among Properties, Museum Shop, Research Library, and Curatorial branches. We worked most closely with the Administration, Membership and Development, Interpretation and Education, Visitor Services, and Finance departments during the course of this project. Some specific individuals from these groups include Kim McCray, Director of Interpretation and Education; Erik Ingmundson, Senior Interpreter; and Chris Mason, Public Programs Coordinator. Ms. McCray has had prior experience with the implementation of systems similar to the iPED tour. Additionally, Mr. Ingmundson works very closely with the museum interpreters, making him a key contact for questions regarding any of the organization's current docent services. Refer to Figure 20 for an organizational chart of this branch of the NHA.

Since its inception in 1894, the NHA has helped to keep the history of Nantucket alive. By building its collections of artifacts and properties, the organization has preserved important aspects of the island's past and made them available for present day visitors and residents to enjoy. In recent years, the NHA has broadened its services, renovating and expanding its museum and making efforts to keep it up to date. Now the NHA seeks to make similar advancements in its other locations by incorporating a technology based guided tour.

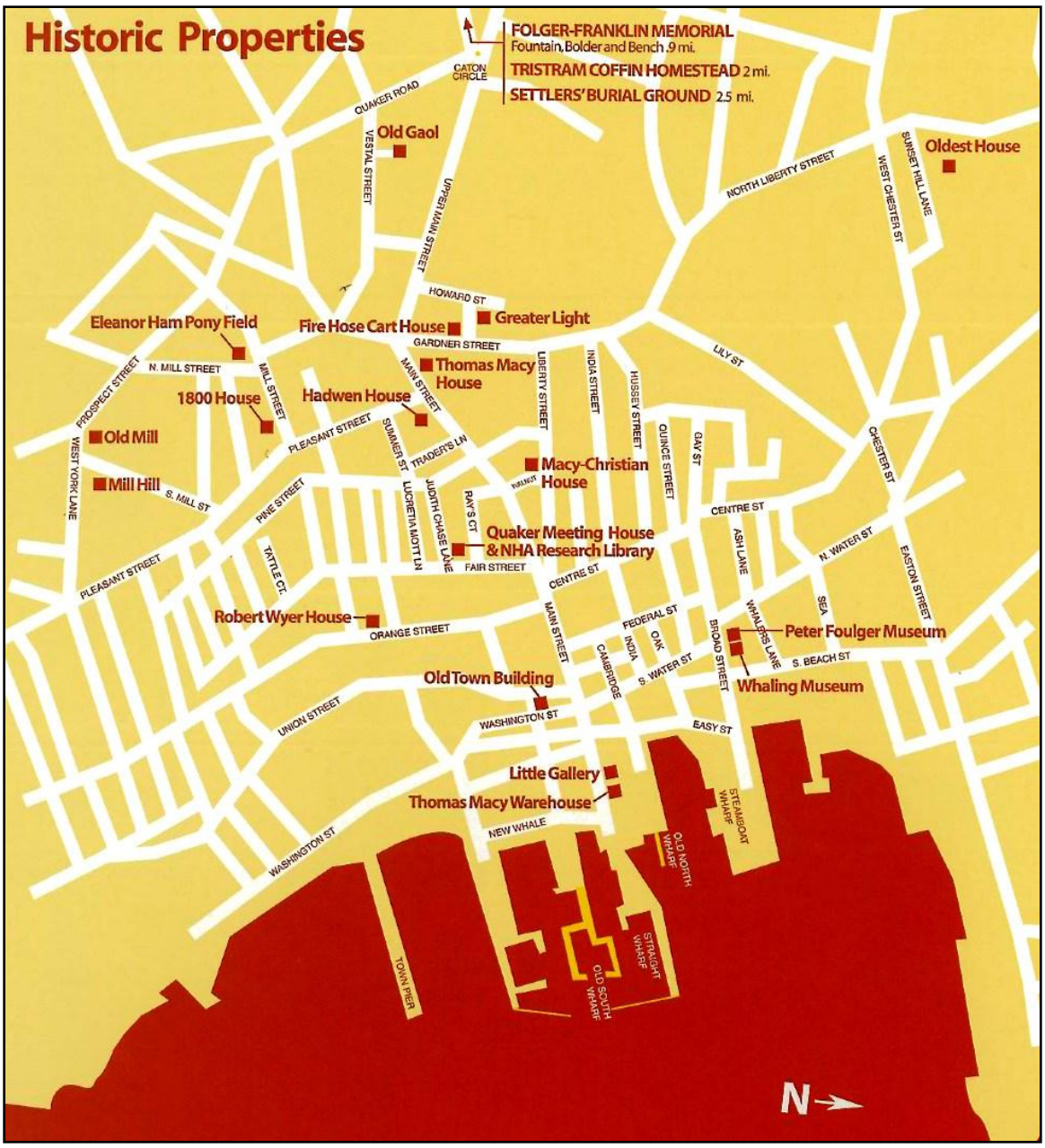


Figure 18: Map of the NHA's historical sites in downtown Nantucket.

IPED Tour of Nantucket

Nantucket Island sits thirty miles off the coast of Cape Cod, Massachusetts. During the 19th Century it was the capital of the American whaling industry, and today the entire island is a National Historic Landmark. With pristine beaches and an inventory of more than 500 pre-Civil War homes, the island swells from 10,000 year-round residents to 50,000 holiday makers each summer.

The NHA, with its 23 sites, is the steward of the key heritage on the island. Visitors learn of the history of this place through tours, museum exhibits and ongoing interpretive programs. During the past two years, the NHA has greatly expanded its programming, and it is now interested in producing a transportable tour of the town. If successful, other tours will follow; but this first prototype will be a general tour of the town, featuring (but not limiting itself to) NHA's own sites.

Your assignment will be to develop an actual prototype tour by the end of your time on the island. You will receive a tour script (or tour script segments) by the time of your arrival and it will be accompanied with ideas of how it can be enhanced and presented through the use of images and sounds. You will take the script and test it in combination with various images and technologies. Questions that we would like you to address include:

- What media is best (IPOD, mobile, etc.)? *Note*: We are particularly interested in knowing about media that is "stable" (i.e. what options do you believe are bound to be around for a long time?).
- How can we incorporate GPS technology along with images and ambient sounds into this tour? Can GPS be *triggered* in such a way as to offer information on a site when you have actually arrived in front of it?
- Once the media is determined, what is the most cost-effective way of offering this option?
- How do we avoid theft and/or damage to these programs?
- How can we include other collaborative cultural partners in this initiative (i.e. the Atheneum, Maria Mitchell Association, Egan Maritime Foundation, etc)?
- What is the best "content model" for the program (i.e. images, GPS, ambient noise, primary source readings, etc).

The answers you come up with to these questions will inform the prototype that you develop. *Please Note:* We are uninterested in being the keepers of hardware, and very interested in being the purveyors of software programs that can be downloaded to one's own technology.

Your team will meet weekly and briefly with an NHA planning group. For the time being, I will be the key NHA contact. The NHA library will be available for your use, and there are also computer stations in the main offices. You will receive free admission to all NHA properties, when they are open.

Figure 19: Original project description sent to us by our Sponsor.

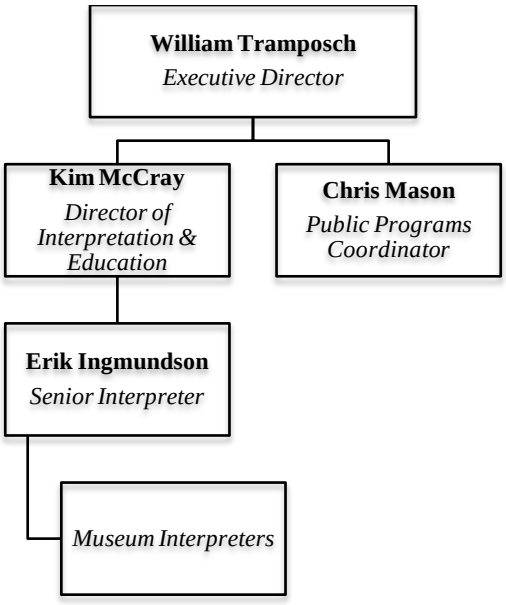


Figure 20: Organizational chart depicting our key contacts in the NHA.

Sponsor Description References

NHA. (2003). In Jensen C. B., Simons B. (Eds.), Properties of the NHA The Creative Company.

NHA. (2008). Your portal to Nantucket history., 2008, from www.nha.org

Charity Navigator. (2006). Charity navigator rating - NHA. Retrieved September 2, 2008, from http://www.charitynavigator.org/index.cfm?bay=search.summary&orgid=4889

Appendix B Cell Phone Tour Provider Contact Script

Hello. My name is _____. I am a student from Worcester Polytechnic Institute and I'm in a group working to provide a cell phone tour prototype to some of the historic sites in a New England town.

1. Can you talk a little about <<Company Name>>?
2. Do you have any recommendations for recording the tour content?
    a. What kind of microphone should we use?
    b. What do you recommend for the length of an audio segment?
3. Have you come across any issues with playback quality over cell phones?
    a. How effective is ambient music and sound effects?
    b. Are these effects diminished by the small speakers on cell phones?
4. Can you give us any information on how to set up a free trial and get a prototype tour running?
5. What can you tell us about the different pricing options?
    a. Are there any limitations to the server, such as a maximum number of callers?

Thank you very much for your time. We hope to keep in touch with you.

Appendix C Phone Call Notes from Thomas Dunne of OnCell Systems

Andrew Labrecque (interviewer) Phone Conversation on Nov 12, 2008 at 10:00 am

- Created an account and began walkthrough and overview of the web interface and tour features
- Support Documents provide an overview of the interface and tour features
- How to recording/upload tracks
    - Can be recorded over the phone
        - All customers call the same phone-in number
        - Enter Account Number – ours is 585-325-8059 – this is the number we call to listen to the tour
        - Enter PIN – ours is 9100
        - Record message
        - Files will be named <phone number> <date> <hours/minutes/seconds>
    - Mp3 and wav uploads also possible, though Mp3 is preferable
        - Go to the Tours Menu
        - Manage Files
        - Browse file to add
        - Upload
    - Stops are created by selecting files either recorded via phone-in or uploaded
    - There is a 5 minute delay for post processing files after uploads
    - 80% of customers use phone-in to record content
    - After each change be sure to Refresh the tour to publish it to the MP3 Download page
        - Uploaded files are stored on a separate computer – click refresh to move files accessible location for tour and download
        - This also makes them available for download to an iPod or Mp3 Player
- The 585 area code is temporary – will change later – visitors are more comfortable with local numbers
- System supports text messaging at an additional fee
    - Charged either per text message
    - Or in blocks – $X for 250 text messages (the exact figures have been deleted from this report due to their confidential nature)
    - Museum decides what to put in the message
- Taking the tour requires the user to reveal their phone number
    - If a users number is blocked, they will be asked to enter it in
    - This is used to track where people are from on the Statistics and Dashboard
    - This requirement can be disabled, but 99% of museums haven't found this a problem
- Statistics Tracking
    - Tracks what people are listening to, and how much of it they listen to
    - Traces their exact path through stops along the tour

    - Can generate an excel spreadsheet for download
    - Statistics come at an additional cost
- What is "snacking"?
    - Aimed at the younger generation
    - Provides a more self guided experience
    - Philosophy of "I know what I want to see"
    - Recommends each stop tell a self contained story
- System comes with standard prompts for introduction, returning introduction, a sponsor message, and instructions
- The system will remember numbers that have used the tour for twelve hours
    - This helps with statistics tracking
    - It also prevents the initial introduction from repeating
- The system also has capabilities for showing pictures and images
    - This feature has to be turned on
    - See Mobi Site for streaming content
- Secondary audio can be incorporated after each stops main segment
    - Can be used as an additional sponsor message – "this tour brought to you by…"
    - Or used for wayfinding – "the next stop in the tour is…"
    - Or used to report hours of operation of certain stops along the tour – "come back at XXX time and see…"
- Built in user feedback capabilities
    - Press *0 to leave voice feedback
    - Press *8 to leave text feedback
- Hosting rates – will need to provide additional information to nail down
    - Ranges from $X a month to $X a month, depending on size of organization, town, expected number of visitors (the exact figures have been deleted from this report due to their confidential nature)
    - Estimates a couple hundred a month for all functionality based on rough description of town
- Streaming content site – alternate method of accessing tour via a smart phone
    - www.myoncell.mobi
    - Search for "Worcester" tour – this is a temporary placeholder
    - Requires a data plan on users cell phone
    - Can add image files to supplement streaming audio files
- Recommendations for creating content
    - Be sure that volume stay consistent
    - Matching volume levels between tracks recorded on phone-in versus in-studio can be difficult
    - Complex audio with background music and effects can work well – simple audio also gets very good reviews
    - "The type of audience you get at an antique boat museum includes people who will listen to five minutes of content on antique boats…"
    - Visitors to historic towns won't listen to extraneous content – "snacking" is best
    - Signage is very, very important
        - In some ways as important as the content
        - Their experience has found maps and flyers terrible

        - "Will cut traffic" but won't kill the tour – "somewhat problematic"
- Suggestions for lack of signage
    - Relate numbers to something already numbered in the environment, such as street signs or house numbers
    - Use temporary A-frame signs, cones, or markers during the day or on weekends to provide signage
    - Use the local newspapers or local TV stations for publicity and advertising
    - Make sure to tell people its FREE – though normal cell minutes apply

Appendix D Phone Call Notes from Michael Giniger of Spatial Adventures

Andrew Labrecque (interviewer) Phone Conversation on Nov 12, 2008 at 12:15 pm

- Pricing is very dependent upon the size of the organization, the size of the town, the number of stops, and the expected number of visitors and users of the tour
    - Would be willing to establish a trial period with a nominal fee
    - Roughly $X-X a month, definitely not more than $X (the exact figures have been deleted from this report due to their confidential nature)
    - The service does offer an unlimited number of concurrent calls
    - A fixed monthly hosting plan (set cost, not by number of calls, or by volume)
- Setting up the tour is "super simple"
    - We write the scripts
    - We record the content
    - Can be recorded over the phone
        - Through a voice portal for our account
        - It is then repurposed, sent through a low pass filter
    - Can also record in studio and upload via a web interface
        - Mp3 and wav formats are supported
    - Can set up a trial to demo the service
    - Will set up a phone number with a local number through Verizon
- Usage statistics tracking
    - Can report number of calls and the number of tours
        - Tours are all repeat calls by the same number
        - Doesn't need to be on the phone the entire time
    - Will also report where people are from
    - Can generate monthly and daily reports
- Recommendations for content creation
    - Keep it short – under a minute
    - Tier the content
        - Provide a general exposition segment initially
        - Provide optional "sub-stops" for further information
- Is there a noticeable difference between content recorded on the phone versus in the studio
    - Not as much as one would think – "Difference not striking"
    - Mp3 and wav files are repurposed and cut down to 64 Kbits/sec
    - Cell phones have mono speakers
    - Offered to send examples of tours recorded through both methods, including one for WGBH Boston
- How do background and ambient sound effects work?
    - Suggests sending two separate tracks
    - These will get processed differently than an individual one
    - Notes that music is not great on mono cell phone speakers

Appendix E Phone Call Notes from Grant Lewis of Guide by Cell

Brendan White (contact) Phone Conversation on Nov 13, 2008 at 2:30 pm

- Content & Recording
  - Ambient/background noise is a distraction
  - Over the phone recording is "As good as a cell-phone is"
  - Better to have professionally recorded content
  - Everything is downloadable podcast ready
  - Each stop is < 2 minutes
    - (90 seconds or less)
- Generic Guide-by-Cell Info
  - Provide a local number
  - Uses real phone lines, as opposed to VOIP
    - Claims stronger interface
    - The way they're different
    - Can have more people accessing the site
  - Can send text messages for marketing
  - Web interface
    - Strong infrastructure
    - Uploads content instantly
    - Displays info on
      - Sites called
      - Listening duration
      - Demographics (where they're from, etc)
- Pricing Structure
  - Fixed is an option
  - Price is per number of calls per month
    - 0-175 calls costs $X (the exact figures have been deleted from this report due to their confidential nature)
    - 176-350 calls costs $X (the exact figures have been deleted from this report due to their confidential nature)
- Miscellaneous comments
  - Handhelds are annoying
  - Guide-by-Cell is the largest in the world
    - Historic New England has over 100 calls this month
      - Average about 300 calls per month

Appendix F Questions for Museums using Cell Phone Tours

Developed by Brendan White, Andrew Labrecque and Rob Matrow as part of their Interactive Qualifying Project

1. How did you make the decision to go with the company you use for the tour?
2. How well is the cell phone technology working?
3. How has the staff responded to it?
4. How have you evaluated visitor response to Guide by Cell?
5. In general how have visitors responded to Guide by Cell?
6. Would you recommend your device to other organizations?

Appendix G Transcript from Sue Moynihan of Cape Cod National Park

Personal Communication with Sue Moynihan, Chief Interpretation and Cultural Resources Manager, Cape Cod National Seashore (Fri 11/14/ 2008 2:40 PM).

I'd be happy to share with you our experience in developing this interpretive program. We tend to not call our program a "tour" because each of the stops has its own subject and theme. They are stand-alone interpretive messages, similar to an outdoor exhibit one might encounter in parks. We like the 24/7 availability and consider the program a supplement to our other media (web, self-guiding trail brochures, park newspaper, outdoor exhibits) and our personal services (visitor centers, guided walks, campfire talks, etc).

We're using On Cell Systems as our service provider. We chose them because several other national parks also use them and were happy with the service. The system is very user friendly, and updating information is a breeze. They have a great statistics feature which allows us to track the number of calls per day, how long callers listen to the various messages, whether they are unique or return callers, and the cell phone number they're using to call (good for demographic information). There is also a feedback feature, whereby callers can leave a voice message about the stop. We've gotten some great feedback and have made some modifications based on comments we've received.

On Cell staff are available and easy to work with. We pay a monthly fee based on how many ports we have. With our fluctuations in visitation, we have more ports to accommodate more callers in summer than we do in winter. We have not taken advantage of some of On Cell's other features, such as podcasts that people can download at our stops.

When planning the stops, we considered the following:

Is there good, reliable cell coverage at the location? Some of our sites have poor coverage, making them bad choices for stops.
What is the compelling story at this location? What will people want to know about at this spot, and how can we make the story interesting to listeners?
Can we tell the story in about 90 seconds? This is about as long as you would want messages to be.
Who should do the narration? Some voices have good sound quality; others not so good.
How will we accommodate visitors who have hearing difficulties? In our case, we let people know we have printed scripts available at the visitor centers.
How will we let visitors know about the service? We developed flyers and posters for our visitor centers, and signage at specific stops.
Who is the audience? A program for adults would be very different from a program for children.

I hope this information is helpful. If you have questions, please feel free to give me a call. Our customer rep at On Cell during our start-up was Becky.

Appendix H Transcript from Amy Schlegel of Tufts University Art Gallery

Personal Communication with Dr. Amy Schlegel, Director of the Galleries and Collections, Tufts University Art Gallery (Wed 11/19/2008 10:11 AM).

1. Why did you decide to go with Spatial Adventures for your tour?

It was the most economical and provided the features we are interested in; it's a small operation that provides good customer service.

2. How well is the cell phone technology functioning, in terms of reliability and quality of service?

Excellent, as far as we can observe from visitors using the service in our galleries.

3. In general, what has visitor response to the cell phone tour been?

Fantastic; overwhelmingly positive; most people have never encountered this at a museum before, so they have been utilizing most, if not all, of the tour stops, which total approximately 30 minutes for our current cycle of exhibitions.

4. Would you recommend this method of touring to other organizations? Why or why not?

Absolutely, so long as it is not a substitute for wall labels. We have designed our tour as a supplement, not a substitute, to our wall labels and publications, to expand upon our interpretation and visitors' learning experience.

Appendix I Transcript from Steven Rector of Valley Forge National Park

Personal Communication with Steven Rector, Management Assistant, Valley Forge National Park (Wed 11/19/2008 1:23 PM).

1. Why did you decide to go with Guide By Cell for your tour?

We chose Guide By Cell for a few reasons. At the time we launched the program, there were only a few cell phone tour providers to choose from.

Guide By Cell has features that allow us change the content frequently and easily using our own employees over standard telephones. Some of the companies wanted us to use professional voice talent and script writers and have a tour that would have been very difficult to update and evolve. The personality of the Guide By Cell CEO was such that everyone instantly got along well with him. The other factor was pricing plans with Guide By Cell.

Rather than a fixed cost, we were able to get a contract that was based on call volume. This is perfect for Valley Forge as our visitation peaks in the summer months and drops significantly in December and January.

2. How well is the cell phone technology functioning, in terms of reliability and quality of service?

We have not had any long term outages or problems with the technology. One of the initial steps in our planning was to make certain cell phone reception was reliable throughout Valley Forge. Being 20 miles northwest of Philadelphia, we have only 1 or 2 dead spots for cell phone coverage. In addition, the major cell phone companies, Sprint/Nextel, Cingular/AT&T, Verizon all have exceptional signal strength within the park. There is a learning curve for those employees recording the messages. Once employees learned how to speak while recording the messages, quality of the recordings vastly improved.

3. Do you have any suggestions for the use of maps/pamphlets in place of signs?

We have used a small postcard with information and a small map. I have attached a jpeg image of the front and back of one of our earliest postcards. You will notice the card has our old telephone number listed, and we have numbers on the map on the back of the card. On our latest version of this map, we removed the numbers from the map. The map now only includes blue "information" spots. (Same blue circle, just no numbers inside). We found from visitor feedback that people thought if they missed

1 or 2 stops, that they could not start the tour at stop 4 or 5. We have about 10 entry points into the park and at least 10 parking areas for visitors. It was important for us to let visitors know they could begin the cell tour anywhere they wanted. The result was removing the stop numbers from

inside the blue circles on the map. Whether you choose to use a numbering system or not is dependent on the type of tour you decide upon in your early planning stages.

4. In general, what has visitor response to the cell phone tour been?

Overall, visitor feedback has been fantastic. Initially we had a few visitors who were unsure about using minutes and airtime. Occasionally, we still get some of that. This mainly comes from older visitors who may be on an old plan or an extremely limited plan. Most visitors have no problems using their cell plan minutes or the system. From the comments we have received, the most common include:

- Visitors love that the tour can be taken at their own pace. No CD or tape to try to synchronize driving/walking speeds.
- Visitors love that it can be accessed anytime, early morning, evenings, holidays, times when the Visitor Center is closed.
- Visitors love that they can listen to as much or as little as they want of the tour. Repeat visitors, can listen to different parts of the tour on different visits or hikes.

5. Would you recommend this method of touring to other organizations? Why or why not?

I would certainly recommend a cell phone tour to other organizations, under certain circumstances. With a properly thought out and well designed tour, the program can be quite successful. An example of a failed tour exists at a National Park not from Valley Forge. This park has limited cell phone coverage from a single provider and has very limited visitation - around 60,000 people per year. Visitor use of this tour is next to nothing. This is an example of implementing technology for the sake of being able to say an organization is utilizing technology. Be wary of this type of mindset.

I would caution any organization to spend a good amount of time in the development phase of the tour to verify that this type of program fits into the overall visitor services goals, is a viable option for that organization's visitors, and the end product will be able to be used by the majority of their visitors. You should also set a predetermined time frame for evaluation of the system. All the factors for a good tour can be in place, and a tour still not get the visitor response that expected or intended. Every organization needs to be able to evaluate a program and be prepared to terminate that program if it becomes apparent that it is not being utilized.

Personal Communication with Steven Rector, Management Assistant, Valley Forge National Park (Mon 11/17/2008 10:59 AM).

The company we use at Valley Forge is Guide By Cell based in San Francisco, CA. They have a website at www.guidebycell.com. I believe Guide by Cell is offering a free trial of the service.

Since we use an outside vendor to provide all the hosting of messages, phone numbers, usage statistics, etc, there is a cost involved. The first step for your organization is to determine if you are going to charge for the tour, or offer it for free. If the tour is to be free to the public, the

organization will need to determine if funding will be available to cover these costs, or if you need to seek outside assistance through grants and donations.

Here at Valley Forge, we secured an outside grant from Unilever/Lipton Tea to offer the program free to the public, and advertise the program for about 18 months. After that time, we were able to get a partner group,The Friends of Valley Forge, to cover the costs of the program. This way, the cell phone tour does not reduce our overall base operating budget.

The next step is to decide how you want your program to be offered. Is this going a sequential tour, with a definite start and end point? For Valley Forge, we already have a 10 stop driving tour set in the park. The 10 stops have been the same for over 30 years. We simply based our tour on those 10 stops. However, we made the decision early on, that we wanted visitors to be able to enter the cell phone tour from any of the 10 stops. This means there is no definite starting point or ending point on our tour. This gives visitors the opportunity to skip certain stops and pick back up into the tour without feeling as though they have missed something.

Once you have gone through the planning and decision making process of how the tour is to function, you simply start writing for scripts for the tour.
We tried to keep all of messages to 2-3 minutes. We wrote scripts to ensure that we would keep to these time limits. Our initial cell phone tour was recorded over a standard telephone line. Recently we have been recording digitally and uploading the messages through the Guide By Cell website.

After the tour is designed and ready for the public, don't forget about advertising the program. We printed small postcards to hand to visitors, posted signs at each of the tour stops, and bulletin boards, and near restrooms.

Our program launched in July 2006 and we have had almost 38,000 inbound calls to the system and over 70,000 messages delivered to visitors.

If you have any other questions feel free to contact me.

Appendix J Initial NHA Meeting Topics

What follows is a preliminary and rough outline of our initial meeting with the NHA.

1. What is the origin of the iPED Tour?
2. What do you expect of the iPED Tour?
3. How much information do you expect the iPED Tour to provide to visitors?
4. What do you think the visitors are look for from the iPED Tour?
5. What questions should we ask the visitors to better understand what they want?
6. How would you prefer this information be provided?
    a. Audio?
    b. Video?
    c. Text?
    d. Pictures?
7. Do you think GPS or similar location-sensing technology is important to a tour of downtown Nantucket? Why or why not?
8. What sites would you like the tour of Nantucket to include?
9. Do you have an approximate budget for the iPED Tour?
10. Are you considering charging a fee for this tour?
11. Have you ever been to a museum that utilizes tour technology that you like?
    a. What did you like about the technology used at the museum?
    b. What didn't you like?

Appendix K Transcript of Initial NHA Meeting

The names of individuals have been abbreviated to conserve space. "T" is Executive Director Dr. Bill Tramposch, "K" is Director of Interpretation & Education Kim McCray, "E" is Senior Interpreter Erik Ingmundson and "I" is any member of the iPED Group.

T: Mary and Al Novissimo do our technical work, all of our technical work and they are keenly interesting in what you guys are up to. And they want to work with you put their ideas on it too, and they'll be very helpful. They do all of our, our tech stuff.
E: Maybe we could introduce them on Tuesday after the ops meeting I think that
T: Yeah, that would be good
E: They could just face to face.
T: That's right. And Julie's got their telephone number, and I would just recommend calling and introducing yourselves. They can't make it tomorrow, that's right.
I: Okay
T: I said that you would follow up on that.
I: Okay, certainly
T: But, that would be great. Kim will join us in a minute. How are you doing, so far, good?
I: Good, These are our surveys that we've made up.
T: Oh good, okay.
I: With your permission we're looking to survey some of the guests over the next few days.
T: Ah, right. You've all met Kim?
I: Just, would anyone have a problem if we were to record this for notes purposes?
E: (banter)

<Kim McCray enters>

T: This looks very good. (Explains surveying to Kim)
E: So you had a prototype in this wonderful abstract that I scanned.
I: looks nice all stapled up, there have been a few changes since that copy.
T: I like #12, "would you rent this?"
I: We pretested this survey with our fellow WPI students, worked out some bugs this morning. This is the most updated version that we have.
K: Can you talk to me a little bit in terms of your methodology and how you're going to implement this as a survey instrument.
I: We'd be looking over this coming weekend, since when the museum is open, picking out people, groups or individuals at random, perhaps as they were heading out of the museum. Every second or third pair, approaching them, introducing ourselves, using the opening phrasing there, explaining what this is, and then asking if we could ask them this series of questions. We would hold onto the survey itself and then circle their answers
K: Okay.
I: That's why the survey is set up the way it is.
K: Right, okay. That was my thought; I just wanted to make sure.
E: What do you think about the location? Catching them as they exit? I'm trying to think of the way that will give you the best opportunity to get the kind of information that you want.

K: I think if you do it as people exit they've had a little bit of time to reflect on their visit but may not be willing to take the time.

E: I think the main obstacle you're running against is that most of the time, people are leaving the museum and running off to catch a ferry, which can leave them a little bit hurried. There's a couple ways to survey. When we had interns, last summer, we had them post themselves in different areas of the museum.

K: It was Mainly 1 particular location. We put them up near the Foulger Gallery and the scrimshaw gallery. That's usually the mid part of a visitors visit and they often have more time. And it's also a good comfortable spot where people don't feel cornered and they have space to move around and get their bearings. That's one place I'd recommend. Gosnell Hall is very good, before and after programs.

E: That sort of entry into the Candle Factory is a good place.

K: Just be consistent in terms of your methodology.

E: You might take some time to float around first, watch the traffic flow and then decide, let's make this our survey area.

I: What do expect out of the iPED Tour?

T: I'll let Kim answer

K: First concept was to make walking tour more accessible. Since then thinking about other creative ways that people can access info about our sites when they're not open or tours aren't available. We have limited hours and limited personnel resources. 1 Idea to focus on 2 to 5 of our sites in iPod or Cell phone tour and offer them information even if it is after hours. It's morphed into that.

E: We're always looking to expand and reach new audiences. Something I think is at the core of the iPED.

K: One thing we'll need to think about is how to make it accessible but not overriding the other tours.

E: In other words it should be a way to add to the tour, not replace it.

K: Enhancement to the accessibility rather than a replacement. I could see us building a really great audio component and having the guest say "Oh, I can just listen to this instead of going inside the house." We have to think about those challenges as well. Feel free to ask Erik or myself questions about the hours of our sites and other information about them, here and at the library.

T: I've asked Harvey Young, the bike shop guy, if he'd come tomorrow. Kim & I have talked to him about some time the notion of a pedal tour. We're picturing this notion of this being a way for you to get to know the NHA sites. We start with the core ones. The main thing is, the risk we run tomorrow with bringing other people into this discussion is them asking "Can you do this? Can you do that for us?" I want me make it really clear that we're asking you to this discreet prototype of our sites. So who knows where this will lead to after that but we don't want to saddle you guys with more than you can handle.

I: That had been one of the questions we were going to ask, of "How expansive is the tour? Would it be just the NHA or expand to feature other museums and other sites?" My understanding is to start off small initially within the NHA.

T: One thing that I can promise that tomorrow you will hear that other places have historical significance, and that is why I've invited them to come.

K: One place you may want to start is the Old Jail. Right now there is limited signage at the site.

E: That's a place that would benefit a lot from something like this.

K: We open it every day in the summer and we do get visitor, even though it isn't staffed. Erik & I went up there once to close and visitors asked if we had time to give them a tour. There's a lot of really great escape stories about the jail, really interesting facts about how much iron and what it cost.

E: And just the atmosphere.

T: I'm wondering if this (referring to the "Properties of the NHA" book) might be good for the basic, beginning text. In effect this is it on paper. And if people had the chance to go the site with a cell phone and you guys in the next 8 weeks could provide with Erik & Kim's help the dial-up numbers and whatever is required, we'd be there. It'd be a companion piece.

K: That's what we're talking about, without sacrificing the info provided when sites are open. Also, the sustainability of it, something that we're charging for to help cover the cost.

T: It could be that as we position this thing, most of these sites are either not open or not staffed. It could be the kind of thing that we promote in our sites. "Have you thought about taking a town tour and getting an interpretation of the sites?" The more I think about it, this would be a tremendous guide and I'd recommend that you get around on your bikes and tour the sites.

I: We were intending to look around at all of them at some point soon.

I: We are curious on your thoughts on the different technologies that we presented with our proposal? We're curious what you thought about them.

K: I've had some prior experience some things like this. I'll almost always lean towards the cell phone tour first because there's limited maintenance and the information is easy to change and there's no hardware to upkeep or maintain. We wouldn't have any handhelds that we'd have to charge the devices. We really want to do this but we don't want to spread ourselves too thin.

E: I concur with that and would add that cell phone is the most interesting method is widely distributed technology already and it's more likely that the older demographic is more likely to have one. I think that's another reason the cell phone is more accessible.

K: The sites that we're looking at are ones that are outdoor sites that people can walk to.

E: More often than not they'll be carrying a bag of stuff with them already.

T: Agree with all of them, interested in hearing distinct, recognizable voice, also have introductory sound of carriage, or other ambient noise, to be but into scene, since sites cover four centuries.

K: Doug Burch is an interpreter with great voice, used to work in radio

E: (He) had a career in advertising and marketing, can make things that sound good

T: Does Essex Gam, and it is mesmerizing, we should sit in on that; was a wonderful writer, and would be good resource.

K: Very witty and energetic

T: Another thing is that we shouldn't make these dry, but also not too whimsical that it sacrifices authenticity; let's have fun with it, with the noises, and anecdotal (as long as we're confident with the accuracy)

K: Something else you might find helpful that we can give you is a copy of the interpretive themes which drive the educational objectives that we have at the museum, important because we also make sure that we are trying to do is being able to connect to present day Nantucket. A lot of stories start in the origins of Nantucket, but circle back to present day, and we need to make sure that is integrated as well

I: At this time you're very set on going with the cell phone, do you want us to start working on the prototype of that, after the survey, when?

T: I know I feel that way, knows Kim and Erik like the cell phones, important to meet with Al and Mary, since they might have other ideas, always surprising in their approach to things, might have a different take, but we're sold on cell phones because of their ubiquity.

E: Still thinks that surveys will be good because it never hurts to get the data.

K: What we think not always what the visitors feel, could be that visitors don't want to walk around downtown with a cell phone

I: You've had a chance to look over the surveys; do you think there is anything else we should add into them?

E: For question 5, I could see a lot of follow up question, "could you tell me about that experience," focus that in a little more

K: Just did conference about this type of stuff and person doing it would be happy to look over questions to get feedback on them. If you have a few days, I can give you that contact info. Would see if questions are specific enough, and not leading,

E: Surveying takes lots of years of experience to get hang of; looks like great start, Connie might be able to help.

K: Evaluations are great, but to people are new to it, you collect data that isn't specific enough, or data you can't use, want it focused so you know what you're going to do with the data

T: Adds that we might want to give people a copy of Historic Nantucket at end, will get example of it

K: That's something we do with visitor surveys, give out pencil or some other token of appreciation.

K: Initial sites should include Old Goal, Quaker Meeting House. Also Fire Hose, which is unstaffed, and holds a lot of interesting things, "walk in walk out," tells story of great fire.

T: Describes Historic Nantucket book

I: We were hoping to do some of the surveying this weekend if possible, and how many expected visitors.

E: Some factors in visitation, weather important, wind stops ferries, could either stop visitors from coming or forces visitors to find something to do who are stuck; most likely just und 100 people a day, different than in summer where they can see upward of 900 per day

T: Should get you some vests

K: Something else with survey, if responds with no ask why

T: Wondering how write up goes, work with Kim, Erik, myself with successive drafts

I: Hopefully working closely with you on survey, but there is also a final report that goes to WPI

K: Another question is if you were to take a walking tour how long would you be willing to spend. Also how much content should be included in stops? Erik and I love our sites and can go on for hours

T: That's a good question, how long would you be willing to stand I front of places

I: In methodology we had laid out plans to study the different technologies, should we advance plans for prototype?

K: That's the direction we would like to go in…

E: But we want to make sure that this is also an educational project for you.

I: They always tell us that it can change a lot from initial thoughts.

K: Though knowledge of other systems good in this field, especially when talking to colleagues

I: Do you know of any other museums/organization that we should look into.

K: The American Association of Museums has a technology committee; most cell phone based tour users are art museums.

K: University of Maryland was looking into GPS and technology and its applications (6 years ago)

T: Some concerns, Kim thinks that if we do phone tours, we don't want it to interfere with sales of real tours, thinks we have a real foundation with this publication. At end of time here, it would seem reasonable that you could come up with a prototype audio tour of our sites, which are very well marked. Two points, hear about oldest house, oldest house on original foundation, and hear these ambient sounds, and introduces you to it, and at the end of every call you get a little pitch, which Doug can help, it's an advertisement, like a cookie you see on the computer urging you to come on in. what it is is an encouragement to come inside after you have heard about the outside. See if Doug could help with the refinement of the text. Not think about how we would pay for that right now.

K: There also may be others who are interested in being involved, don't want to exclude them

T: This book (Blue Book) is close to what we want, but needs to be revised since it has been out for a while.

K: At interpreters meeting you can talk about this meeting and see if interpreters are interested.

I: Initially thought that we would have to do voiceovers ourselves, but having interpreters do it would be great.

K: That would be good from our side as well, since we use almost everyone when we do anything now

E: Make sure to tell interpreters about short term goals of this project, and that this is meant to supplement, not replace them.

T: Really stress that this is just a supplement, made to make them buy a ticket to come in. Have to leave to get ready for tonight, theme is black and orange.

<Dr. Tramposch Leaves>

I: We're going to be presenting to the Nantucket REDs tomorrow

K: REDs = Random Executive Directors, easy to forget name

I: What should we include in presentation; we've shortened original presentation to about 10 min.

K: REDs a great group of people with a wealth of knowledge and experience, most interested in idea itself, the research, stress that this is overarching prototype for NHA, but has future applicability for them.

K: Rely on Erik since he is team captain of interpreters, interpreters will ask more questions, they will be specific.

I: Do you see any applications for the GPS technology, giving dynamic directions

K: Really think GPS has a lot of potential, but it is too early to get involved with it. As a silent partner in the SyGuide project, (I'm) hesitant to jump on board with it so quickly. Typically those organizations have full technology departments; NHA does not have that infrastructure. GPS is good technology, but not viable option at this time since cost and other factors.

I: Cell phone tour lends itself to iPod or MP3 possibility.

K: Just had meeting with Jim Olson does technology at Davis Museum, and uses podcasts and Facebook as tool, teaches at Tuffs. Both Erik and I reflect on meetings, don't be surprised to find messages from us.

I: Recites group email

E: My email is erik@NHA.org

I: Dr. Tramposch talked about origins of iPED tour as coming out of the Urban Land Institute from lack of navigation in downtown area. What are your thoughts on the birth of the tour?

K: ULI came in recently, but Bill and I have been thinking of wayfinding in general for a while since I got here in Feb of 2007, and previously between Dr. Tramposch and Erik. Before ULI we had talked about the Quaker Meeting House, before I got here, as part of a wish list, developing strategic plan. A big part of that is the QMH which is a site that people can walk through on their own, and is a quite place with simple design. Trying to find ways to give it life, gave suggestion to group since I had previous experience with the Old South Meeting House as an example of a location that uses an antenna audio tour, where visitors get a headset with description of location with ambient noise that tells why it is important. Wanted to know what we could do with the QMH to make it engaging.

E: QMH hard to deal with logistically because there is no one on staff to do tours. Sometimes we pull someone from another location to go there to give a talk. Try to integrate the importance of Quakers into tour.

K: In regards to the antenna audio tour, that they constantly had to maintain and update it, didn't always operate as they wished, and very expensive, which lead to the discussion of cell phones. Might get comments about how cell phones are not allowed in museum, and interpreters hate them. Possibly do research in cell phone usage on personal level.

E: Looking into something that is avoided and hated into something useful.

K: Don't want cell phones in museums, too distracting, not for museum environment

E: Cell phones today are the equivalent to cigarettes in the 60s

<End of Transcript>

Appendix L Museum Visitor Survey

1) Is this your first visit to Nantucket or the NHA? *Yes (skip to 3)* *No*

2) Are you a member of the NHA? *Yes* *No*

3) Have you used the Internet to discover activities or events on Nantucket?

Yes *No*

4) Have you ever been to a museum that uses an electronic device that provides a tour?

Yes *No (skip to 6)*

5) What museum was that? Could you tell me about that experience?

_____

6) If you were to use an electronic device to take a walking tour of downtown Nantucket, which of the following types of information would you find most helpful and interesting?

Directions	***Historical Sites***	***Nantucket Legends***
Tourist Information	***Historical Persons***	***Historical Events***

_____

7) For any single site, what should the maximum length of the audio segment be?

Min:_____ Sec:_____

8) Are you carrying a cell phone with you today? *Yes* *No (skip to 12)*

9) On a scale of 1 to 5, five being excellent, please rate your cell phone reception on Nantucket. *1* *2* *3* *4* *5* *N/A*

10) If a tour worked by calling a specified number to listen to information about sites on Nantucket, would you use it? *Yes* *No*

11) Do you have an iPod or other music player? *iPod* _____ *No (skip to 15)*

12) Can it play video? *Not sure* *Yes* *No*

13) If a downloadable tour existed, would you download it to your music player and use it to take a tour of Nantucket? *Yes* *No*

14) Suppose there was a device for rental that provided instructions for navigating downtown Nantucket and provided historical information based on your current location. Would you rent it? *Yes* *No (skip to end)*

15) How much would you be willing to pay for such a device?

_____ *< 5* *5-10* *10-15* *15-20* *>20*

Thank you for your time and participation. Do you have any other questions or comments?

Figure 21 Copy of Visitor Survey administered November 1st through 3rd

Appendix M Museum Visitor Survey Results

1) Is this your first visit to Nantucket or the NHA?	Yes - 39
	No - 22
2) Are you a member of the NHA?	Yes - 5
	No - 17
3) Have you used the Internet to discover activities or events on Nantucket?	Yes - 42
	No - 18
4) Have you ever been to a museum that uses an electronic device to provide a tour?	Yes - 51
	No - 10
5) What museum was that? What did you like or dislike about?	Listed Below
6) If you were to use an electronic device to take a walking tour of downtown Nantucket, which of the following types of information would you want included? Please rank your top three, with 1 being the most desired	Listed Below
7) For any stop along the tour, what should the maximum length of the audio segment be? (Average Listed)	7.38 Minutes
8) Are you carrying a cell phone with you today?	Yes - 54
	No - 7
9) On a scale of 1 to 5, five being excellent, please rate your cell phone reception on Nantucket.	4.11 out of 5
10) If a tour of historic sites on Nantucket worked by having you call a specified number and entering the site you want to hear information about, would you use it?	Yes - 40
	No - 14
11) Do you have an iPod or other music player?	Yes - 40
	No - 21
12) Can it play video?	Yes - 25
	No - 12
	Not Sure - 3
13) If a downloadable tour existed, would you download it to your music player and use it to take a tour of Nantucket?	Yes - 30
	No - 10
14) Suppose there was a device for rental that provided instructions for navigating downtown Nantucket and provided historical information based on your current location. Would you rent it?	Yes- 45
	No - 15
15) How much would you be willing to pay to rent such a device for the day?	$12.80

Table 9 Results of Visitor Survey

Location	Comments
Philadelphia Art Museum	
Modern Art Museum, NYC	Neutral
Metropolitan, MOMA	
MOMA	
Museum of National History, NY State Museum, MET	
Tahoe thinks at your own pace. U.K. Museum	
Museum of Civilization, Ottawa	
ZCA (Zoar, Ohio)	Nice CD Walking Tour
Boston MFA	
	Reference Survey 15
MFA	
Longwood Gardens,	I found it informative
Chalian de Chemmceau, France	
Art Museum.	Allowed me to go at my own pace
	Reference Survey 24
The Rock "Alcatraz"	It made it individual, at your own pace
Museum of Science, Boston	
Prada,	informative
Prada, Madrid; Louvre, Paris	
British Museum, London	
Art museum in Buffalo, NY	ability to go at own pace
	likes to skip stuff
San Jose Art Museum, CA	
MFA, Boston; Louvre, Paris	
MFA, Boston	
MFA, Boston	
Metropolitan Museum of Art, NYC; Other NYC Museums	
Graceland	
Chicago "Body Works"	age appropriate info
MFA Houston	(Reference Survey 41)
Metropolitan Museum, NYC	
Oklahoma City Museum	
Met, Guss	
several,	always good
VA Beach - Norfolk naval Museum	
MOMA, NYC	Reference Survey 50
MOMA, Smithsonian	
Met in NYC, MFA Boston	
Cleveland, Hermitage in Nashville	
Alcatraz	go at your own pace
Andrew Jackson Home, Connerberry Shoppes Village	audio tour headset
Washington DC, Louvre	headphones with a map
Washington DC, Louvre,	headphones with a map
Smithsonian	headset audio tour
Smithsonian	headset audio tour

Table 10 List of museums with electronic guides from open response Survey question

Content	1st Choice	2nd Choice	3rd Choice
Directions	5	4	7
Local Attractions	8	2	4
Historic Events	9	10	16
Historic Sites	20	14	7
Historic Individuals	1	10	8
Nantucket Legends	6	9	7

Table 11 Guest preference of tour content

Appendix N Museum Visitor Survey Visuals

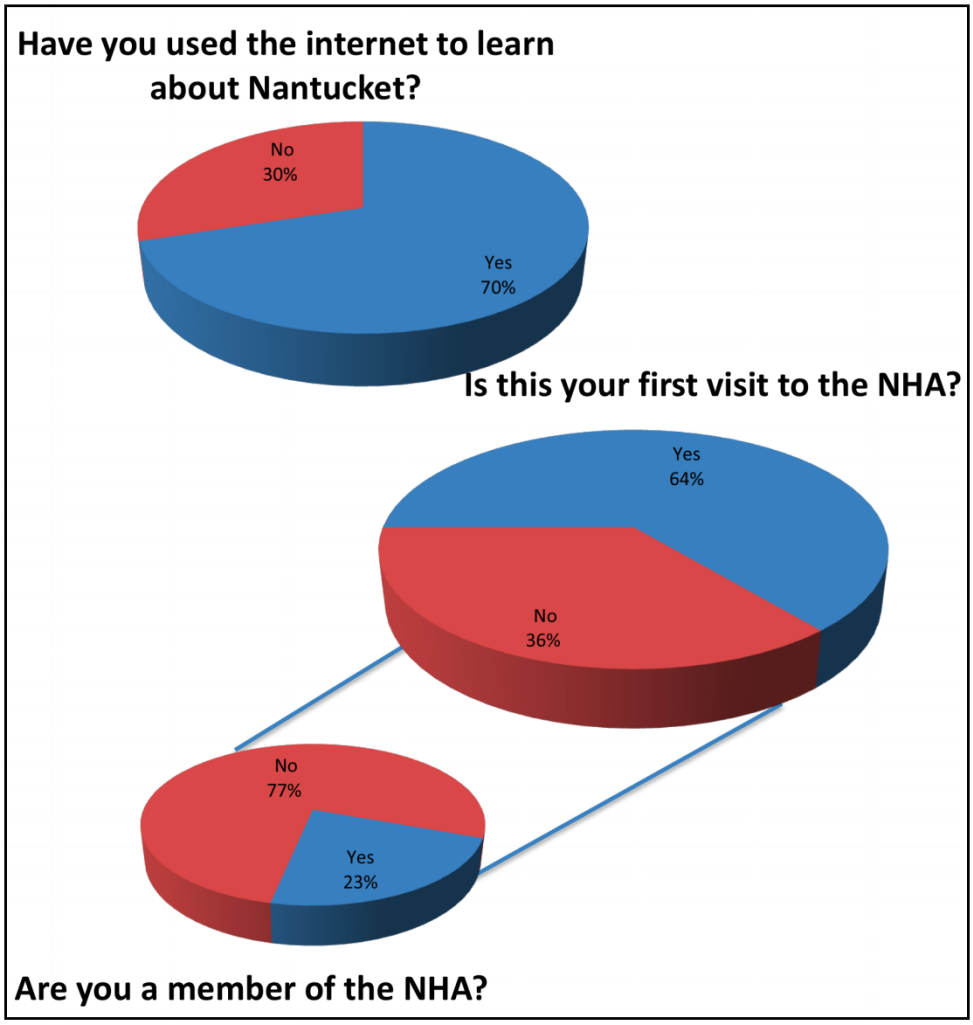


Figure 22 Museum patronage and Guest use of Internet

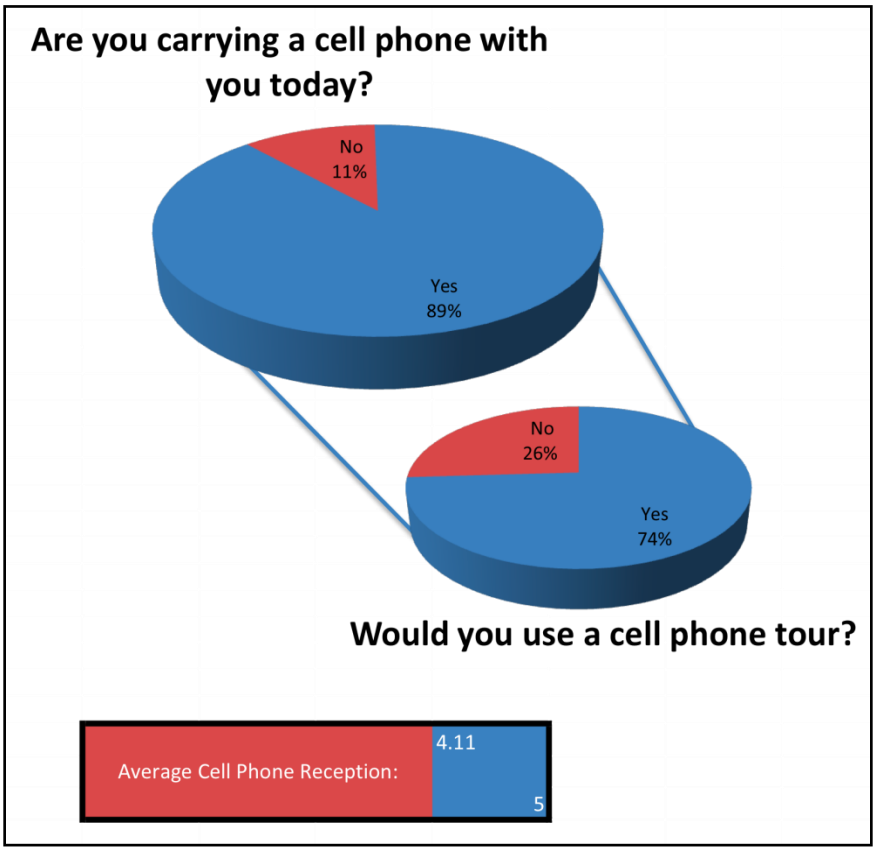


Figure 23 Cell phone results from Visitor Survey

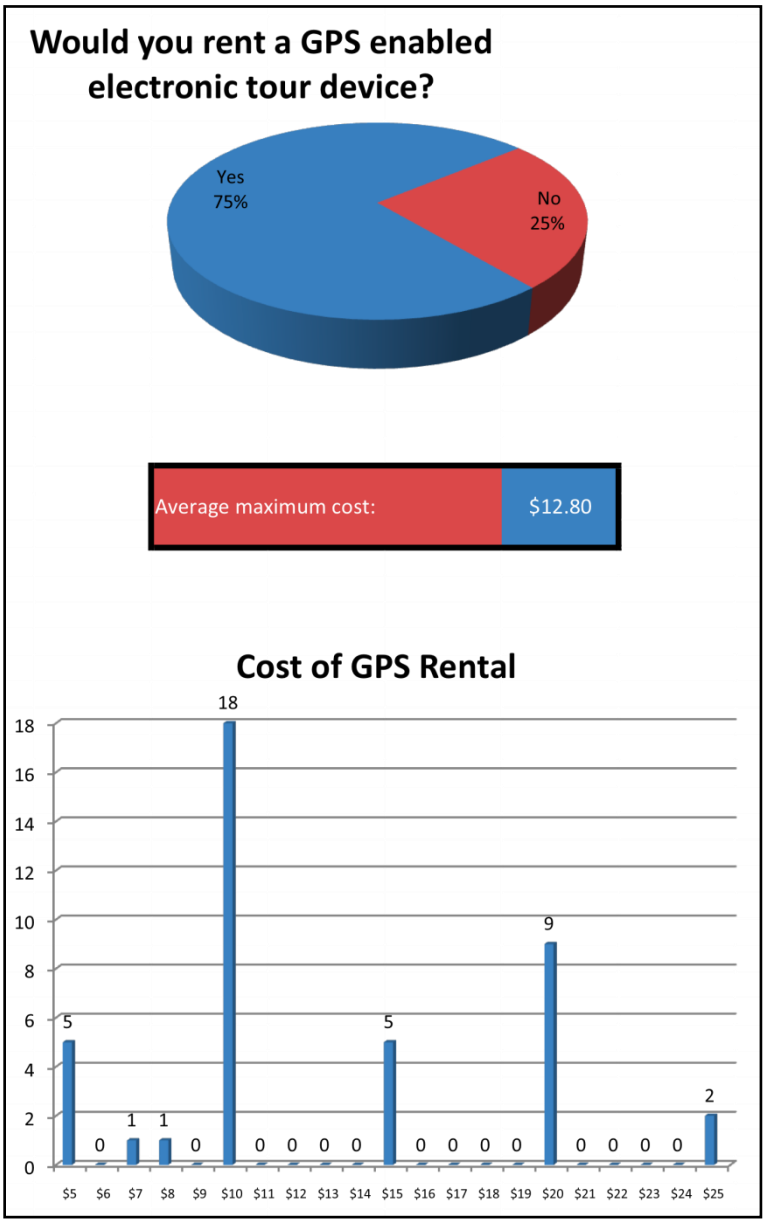


Figure 24 GPS results from Visitor Survey

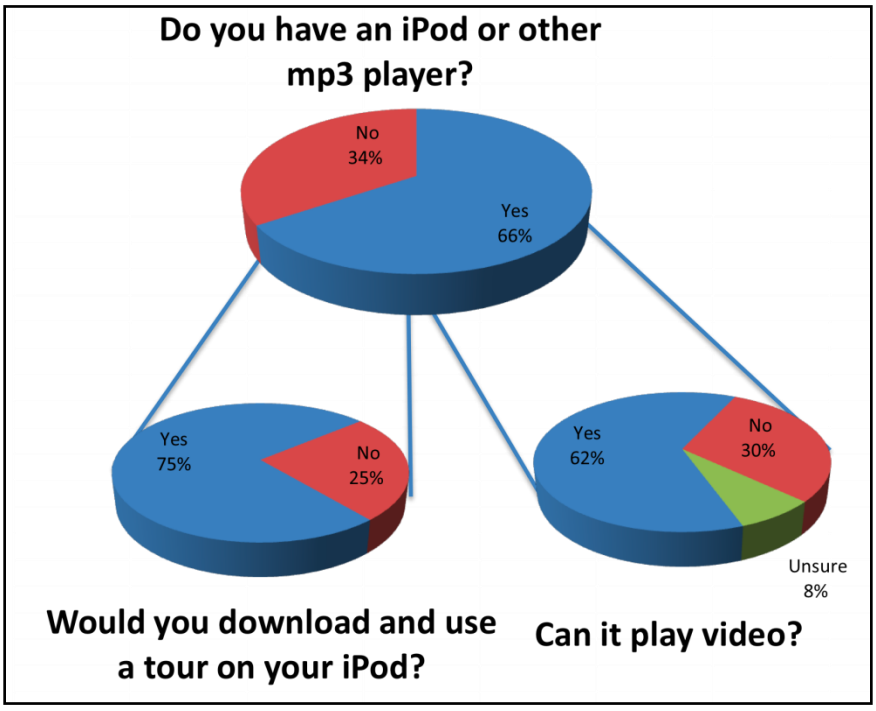


Figure 25 iPod results from Visitor Survey

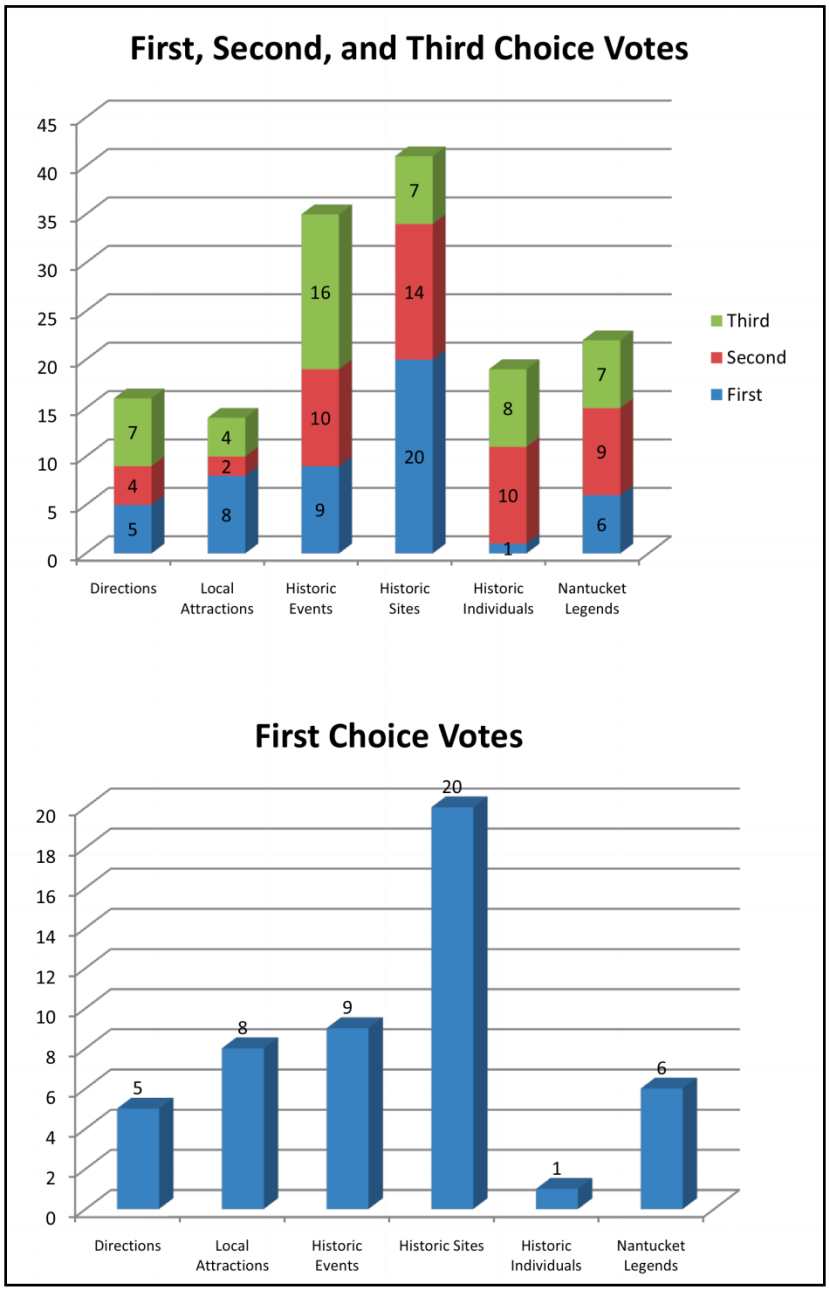


Figure 26 Tour content results from Visitor Survey

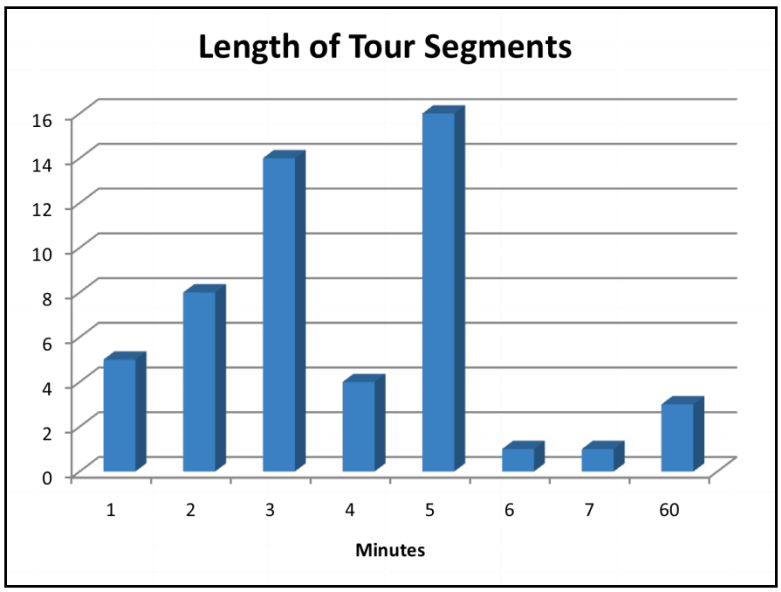


Figure 27 Guest preference of each stop length

Appendix O Final Tour Scripts

Greeting

Welcome the iPED Prototype Tour of Nantucket!

This cell phone tour provides historical information on some of the many sites owned and operated by the Nantucket Historical Association.

To use the tour, enter the number that corresponds to your location on the map.

You can call back at any point to re-enter the tour.

We hope you enjoy your visit!

Returning Greeting

Welcome back to the iPED Prototype Tour.

Whaling Museum & Introduction

Welcome to the Whaling Museum. This, the Nantucket Historical Association's main property is located in a former spermaceti-candle factory built in 1847 by Richard Mitchell and Sons. In 2005 the NHA combined the Whaling museum with the adjacent Peter Foulger Museum and extensively renovated each. The resulting building allowed the NHA to greatly expand its offerings. The Museum features a forty-six foot sperm whale skeleton, a Fresnel lens from Sankaty Lighthouse dating from 1850, the restored 1881 Nantucket town clock, and an extensive collection of scrimshaw.

This is where we'll start your tour of the Nantucket Historical Association's properties. Each site features information about its significance on the island.

Thank you for participating in this tour. The feedback you provide through the survey will help shape the future of this program. We hope that you enjoy this tour and will visit us again.

Quaker Meeting House

Our Quaker Meeting House provides insight into one of the important ideologies that has shaped Nantucket and its culture. Quakerism was an influential religion on the island of Nantucket during the height of the whaling era. [1] Its growth on Nantucket began circa 1701, when a traveling Quaker named John Richardson spoke before a group of Nantucketers. It is said that one of the island's community leaders, Mary Coffin Starbuck, was so moved by Richardson that she became a Quaker, and many others soon followed her lead. [1] Early Quaker meetings took place in Mary's home, but eventually larger Meeting Houses were built to accommodate larger gatherings. [1]

By the nineteenth century Quakerism on Nantucket had split into three sects, the Hicksites, the Gurneyites, and the Wilburites. The Wilburites erected this structure at Fair Street in 1838 to serve as a Wilburite school. It was later enlarged and converted for use as a Meeting House. The building's architecture is reflective of the emphasis placed on plainness and simplicity in Quaker culture.[1]

By 1894, well after whaling had faded away on Nantucket, Quakerism had also declined in popularity. The Meeting house was sold to the newly formed Nantucket Historical Association for a price of one thousand dollars. [2] The NHA used the building to house its artifact collection and built its research library adjacent to it. [2]

Sources

1. *Quaker Meeting House.* Nantucket Historical Association. http://nha.org/sites/quakermeetinghouse.html
2. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.

Nantucket Historical Association Research Library

Our Research Library stands adjacent and to the right of the old Quaker Meeting House. It was originally called the Fair Street Museum, and was built in 1904 as a concrete, fireproof structure meant to provide safe housing for the NHA's numerous artifacts and manuscripts. In 2001 the structure was renovated and reopened as a state of the art library and archive.

Our rich collection of primary sources includes manuscripts, maps, books, numerous whaling ship journals and logbooks, and over 60,000 photographs. Our friendly and knowledgeable Library and Archives staff assists students, genealogists, and historians from all over the world. Feel free to visit the library if you wish to begin a search, or start one for yourself at the NHA's website: nha.org. [1]

Sources

1. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.

Quaker Meeting House & Research Library

Our Quaker Meeting House provides insight into one of the important ideologies that has shaped Nantucket and its culture. Quakerism was an influential religion on the island of Nantucket during the height of the whaling era. [1] Its growth on Nantucket began circa 1701, when a traveling Quaker named John Richardson spoke before a group of Nantucketers. It is said that one of the island's community leaders, Mary Coffin Starbuck, was so moved by Richardson that she became a Quaker, and many others soon followed her lead. [1] Early Quaker meetings took place in Mary's home, but eventually larger Meeting Houses were built to accommodate larger gatherings. [1]

By the nineteenth century Quakerism on Nantucket had split into three sects, the Hicksites, the Gurneyites, and the Wilburites. The Wilburites erected this structure at Fair Street in 1838 to serve as a Wilburite school. It was later enlarged and converted for use as a Meeting House. The building's architecture is reflective of the emphasis placed on plainness and simplicity in Quaker culture.[1]

By 1894, well after whaling had faded away on Nantucket, Quakerism had also declined in popularity. The Meeting house was sold to the newly formed Nantucket Historical Association for a price of one thousand dollars. [2] The NHA used the building to house its artifact collection until building the Fair Street Museum adjacent to it in 1904.

The concrete fireproof structure provided safe housing for numerous artifacts and manuscripts. In 2001 the building was renovated and opened as a state of the art library and archive, with a collection including manuscripts, maps, books, numerous whaling ship journals and logbooks, and over 60,000 photographs. Feel free to visit the library if you wish to begin a search, or start one for yourself at the NHA's website: nha.org. [2]

Sources

1. *Quaker Meeting House*. Nantucket Historical Association. http://nha.org/sites/quakermeetinghouse.html
2. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.

Macy-Christian House

Welcome to the Macy-Christian House, built circa 1745. It has been under the ownership and care of the Nantucket Historical Association since 1971. Its story provides insight into the way the town of Nantucket has grown and reshaped itself over the years. The original settlement on Nantucket was actually located several miles to the west of where the current town stands, near a tiny harbor called Cappamet. The settlement was named "Sherburne." When Cappamet harbor's entrance silted up and closed after a storm, the island's inhabitants gradually moved many of their structures eastward, towards the harbor we use today.

It is thought that some of the buildings in this area were originally built to the west, and later moved to their present locations. The Macys, one of the first families to permanently settle on this island, were the earliest owners of this house. This house remained in the Macy family from approximately 1745 until 1827 when the house was sold outside of the family. It was sold for the massive sum of $1.[1]

Much later, in 1934, the Reverend George P. Christian, an Episcopal Minister, and his wife Ruth purchased the house as a summer residence. They spent five years collecting antique furnishings and decorative objects to furnish the house in the "Colonial Revival" style, which was popular on Nantucket for much of the early twentieth century.[2] Today, two rooms on the lower level are decorated in this manner, and during the summer, our visitors are permitted to walk through these rooms during our historic walking tour.

Sources

1. NHA Macy-Christian House Property Binder
2. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.

Greater Light

In 1929, two Quaker sisters from Philadelphia—Gertrude and Hanna Monaghan discovered this site, and found it occupied by a dingy, 1790 [1] livestock barn. Over a four year period, the sisters transformed the barn and property into a unique summer residence. They called it Greater Light, a reference to the Quaker belief that all people have a spiritual presence within them, called an inner light. [2]

The story of Greater Light provides insight into the artistic community on Nantucket, and its growth in the early twentieth century. The Monaghan sisters were well known on Nantucket for their unique home. With its large interior Great Room, outdoor patio, and lush garden, [1] Greater Light stood in stark contrast to the plain dwellings that surrounded it. [3] Greater Light was always well suited for entertaining. Being artists themselves, the sisters enjoyed hosting candlelight concerts, dramatic presentations in their home, and various parties and open houses to benefit island organizations. [1]

Both sisters passed away in the 1970s, [3] but you can still get to know them and their one-of-a-kind home through the Nantucket Historical Association's interpretive offerings. Hanna Monaghan's memoir, *Greater Light on Nantucket*, is also an excellent source to learn more tales of these sisters.

Sources

1. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.
2. ***Greater Light***. Nantucket Historical Association. http://nha.org/sites/greaterlight.html.
3. Beaumont, Susan. *Greater Light*. Nantucket Historical Association.

Fire Hose-Cart House

The building you're looking at is the Fire Hose-Cart House. It was used as a storage facility for fire fighting equipment, and provides insight into how the town of Nantucket has been reshaped over the years. In 1846, Nantucket experienced a devastating fire that began on Main Street. In seven hours, it consumed much of the downtown area including stores, and businesses. The flames also reached the town's oil – saturated waterfront, and many warehouses, oil processing facilities, and wharves lined with casks of whale oil were completely incinerated. It is said that the burning whale oil that produced "a sea of fire" [2].

Beyond the immediate effects of over 800 homeless people, a lack of food and clothing and staggering economic losses, the fire contributed to the demise of the whaling industry on Nantucket[2]. Following the Great Fire of 1846, the Hose-Cart House was built in 1886 at a cost of $412.62[3] to hold the hand-pumped Fire Engine No. 6[3], known as "Cataract" [3]. Similar cart houses were situated throughout the town, enabling volunteer firefighters to respond quickly to any threat of fire[1]. Later used to house hose carts number 7 and 10[3] when the sign above front door was added[3], it remains the last structure of its kind on the island[1]. It continued in use until 1931 when modern fire trucks rendered it obsolete[3]. Come inside and see the "Siasconset Pumper" and other antique fire-fighting equipment[1].

Sources

1. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.
2. massmoments.org/moment.cfm?mid=204 (used to get background on great fire for filler, hoping to use existing intro used by interpreters)
3. NHA Press Release – 1960 found in binder

The Old Gaol (Jail)

This is the Nantucket Historical Association's Old Gaol, built in 1806. When it was constructed it cost over $2,000, about the same as building a whaleship.[1] It was built in a style similar to log cabin, using massive oak timbers. The gaol contains nearly 6,000 pounds of iron[2] with iron bolts running the length of the walls, iron bars across the windows, and heavy wooden doors reinforced with iron. If you look up, you will notice a door on the second story. A set of exterior wooden stairs once stood here to allow access to cells up there. The jail is divided into four cells, each equipped with 2 bunks. At times it was home to more than a dozen prisoners.

For over 125 years, the jail held "criminals, debtors, drunks, roosters and rum."[2] Or at least it tried to. Despite its rugged construction, there are many tales of escape. One famous account is that of a fifteen-year-old boy who escaped by wriggling his way up the chimney. In 1933, the jail was closed when its last prisoner escaped while awaiting trial. This prisoner, Charles Freeman, was recaptured five years later in California, brought back, tried, convicted and sentenced to 25 years in prison.[2]

Sources

1. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.
2. NHA Old Gaol Property Binder

Hadwen House

This part of Nantucket is known as "upper Main Street." During the whaling era it was home to some elite members of Nantucket's merchant class. Here at the corner of Main and Pleasant Streets are several houses of note. One of the leading families in Nantucket's whaling Industry was the Starbuck family, and they owned several houses in this area. On one side of the street are three similar brick houses, called the "Three Bricks."[1] Joseph Starbuck had them built in 1838 for his three sons, William, Matthew and George[1]. Originally identical, so as to show no favoritism[2], the houses were among the first brick residences built on the island[1].

This neighborhood gradually evolved into a Starbuck family compound, far from the bustle of the waterfront[1]. After their marriages, Eliza and Eunice Starbuck lived close to their brothers.[1] Eunice and her husband, William Hadwen, lived across the street from the three bricks, in the Hadwen House[1], the wider of the two white columned buildings. Mr. Hadwen was a successful whale oil merchant and candle manufacturer whose holdings included the candle making factory that is now part of the Whaling Museum[3].

The house's neoclassical façade is the island's best known architectural symbol of the prosperity generated by the nineteenth-century whaling industry, and it was built under the direction of architect Frederick Brown Coleman[3]. While its exterior architecture is quite impressive, the fact that you can go inside and explore the house's interior is amazing in and of itself. The interior is furnished with tables, chairs, china, silver, lamps, and paintings, many of which are from the period when the home first opened in 1845 to welcome family and friends. There is a wonderful story to tell about Hadwen House and its owners, and we hope you come to see to hear all about it.

Sources

1. NHA Walking Tour Document
2. From walking tour by Karen MacNab
3. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.

The Old Mill

This is the Nantucket Historical Association's Old Mill, which is thought to have been built in 1746. Milling and agriculture were very important on Nantucket for much of the 17th, 18th, and early 19th centuries. For many years, islanders relied on both corn and its milled equivalent, cornmeal, as a staple in their diet. [1]

The top portion of the mill can be rotated to face in whatever direction the wind is blowing. Mills designed with rotating caps like this were known as "smock" mills. Tradition says that from a distance, such structures look like a person wearing a smock with a cap on top. [2] Such mills were once widespread throughout Europe, and later, in America. [1]

The Old Mill has changed hands many times during its long life. In 1828 it was sold to Jared Gardner at a price of twenty dollars for use as "firewood." Instead of dismantling it, Gardner restored the structure to working condition. In 1866 it was sold to John Francis Silvia who continued to operate working mill until 1892. In 1897 it was purchased at an auction and donated to the NHA. [1]

There were originally four such mills in this area. This last remaining one is thought to be the oldest operating wind mill in the United States, a testament to craftsmanship of its builders. It is still fully operative, and is used to grind corn into meal even today. When weather permits, corn will be ground here. [2] Be sure to stop by when it's open to see the process yourself.

Sources

1. *Old Mill.* Nantucket Historical Association. http://nha.org/sites/oldmill.html
2. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.

Oldest House

This is the Nantucket Historical Association's Oldest House. Its story is long and fascinating, and provides insight into early life on Nantucket. Thought to be the oldest island structure still standing on its original site, it is one of the island's oldest surviving structures.[1] The Oldest House and its authentic 17th century garden have helped historians learn about the lives of Nantucket's early inhabitants.

The house was built in 1686 as a wedding gift for Jethro Coffin and Mary Gardner. [2] Its history is closely linked to the struggle between two early social and political factions on Nantucket, known as the "half shares" and the "full shares." [1] The conflict, known as the "half share revolt," came to an end through the marriage of two members from these competing factions. Jethro Coffin, the son of a full share family, and Mary Gardner, the daughter of a half share family, were married in 1686, and tradition says that their families jointly built this house for them.[1] The land for the house was provided by the Gardners, and the lumber was provided by the Coffins. The Oldest House has stood since then, passed down from the Coffins to the Paddock and Turner families before being acquired by the Nantucket Historical Association in 1923. [2]

You can learn more about the Coffin family and early life on Nantucket by joining a guided tour when the house is open to the public.

Sources

1. Jensen, Cecil B., and Ben Simons, eds. ***Properties of the Nantucket Historical Association***. Lawrenceburg, Ind.: Creative Company, 2003.
2. *The Oldest House*. Nantucket Historical Association. http://nha.org/sites/oldesthouse.html

Appendix P Prototype Testing Map Handout

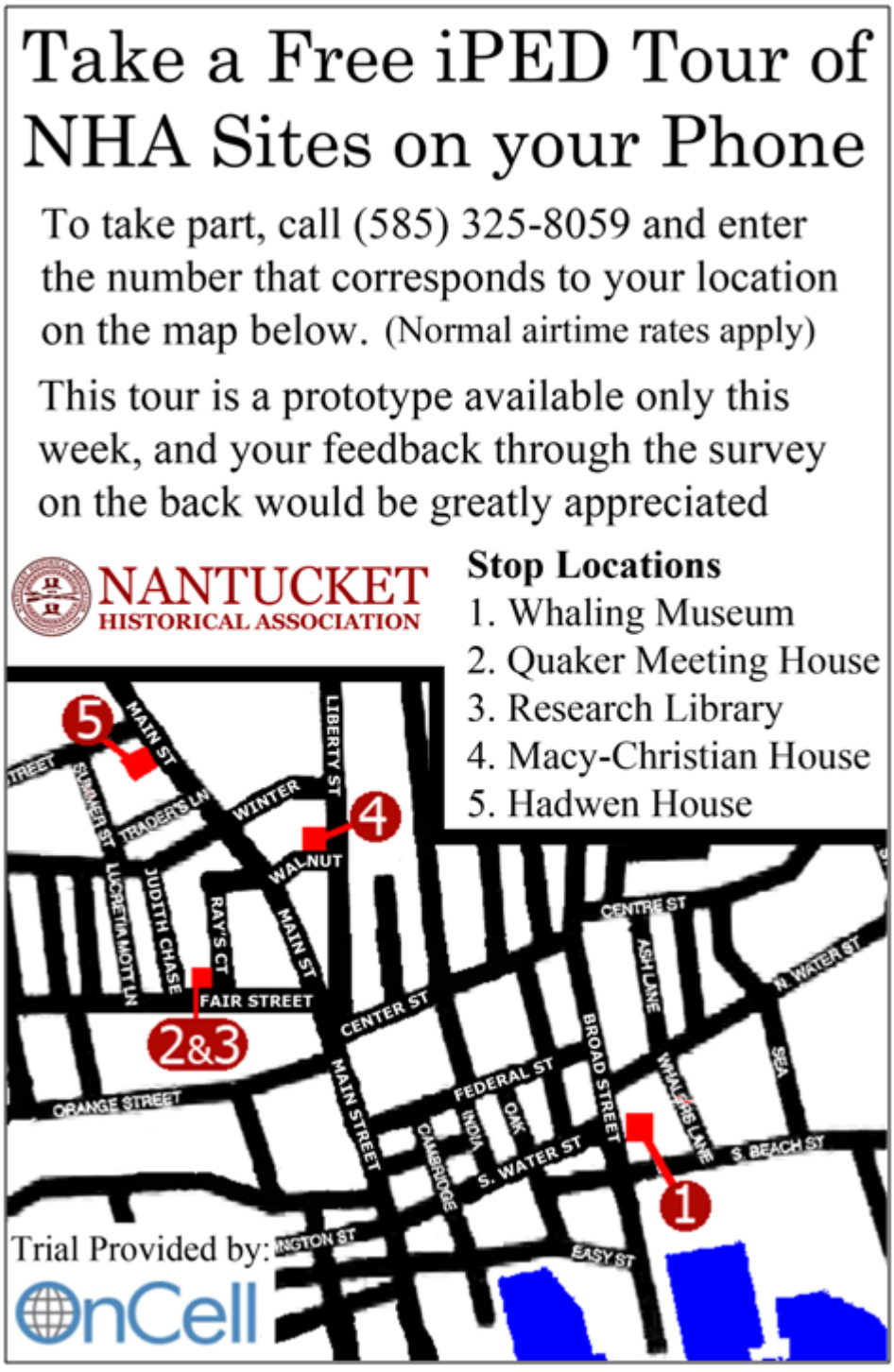


Figure 28 Prototype tour map

Appendix Q Prototype Testing Exit Survey

Thank you for taking our tour. Please take a moment to answer the questions below. Afterwards, return this card to the Whaling Museum (located at 15 Broad Street, Nantucket, MA 02554), or email your feedback to iped@wpi.edu

Did you enjoy the iPED Tour?

Enjoyed Greatly, Enjoyed, Disliked, Disliked Greatly

How easy or difficult was it to take the iPED Tour?

Very Easy, Easy, Difficult, Very Difficult

How easy or difficult was it to use the map provided to follow the iPED Tour route?

Very Easy, Easy, Difficult, Very Difficult

How has the iPED Tour affected your experience on Nantucket?

Enhanced Greatly, Enhanced, No Effect, Lessened, Lessened Greatly

How has the iPED Tour affected your understanding of Nantucket history?

Enhanced Greatly, Enhanced, No Effect

Would the cost of your cell phone minutes limit your use of the iPED Tour? Yes, No

What did you think about the length of tour segments overall?

Too Long, About Right, Too Short

How would you compare the usefulness of the iPED Tour to other audio tours you have taken?

More Useful, Equally Useful, Less Useful, Never Used Before

How easy or difficult was it to hear the narration and instructions during the iPED Tour?

Very Easy, Easy, Difficult, Very Difficult

If difficult or very difficult, why? Please mark all that apply, or write in your response(s).

Quiet Speaker, Background Noise, Poor Sound Quality, Dropped Call(s),

Other: _____

Should the NHA expand the iPED Tour to include more of its historic sites? Yes No

If no, please tell us why:

Please tell us what you *liked* and/or *disliked* about this tour, or any other comments:

(Optional) Please enter the last 4 digits of your cell phone number: _____

Figure 29 Prototype type tour Exit Survey

Appendix R Prototype Testing Route

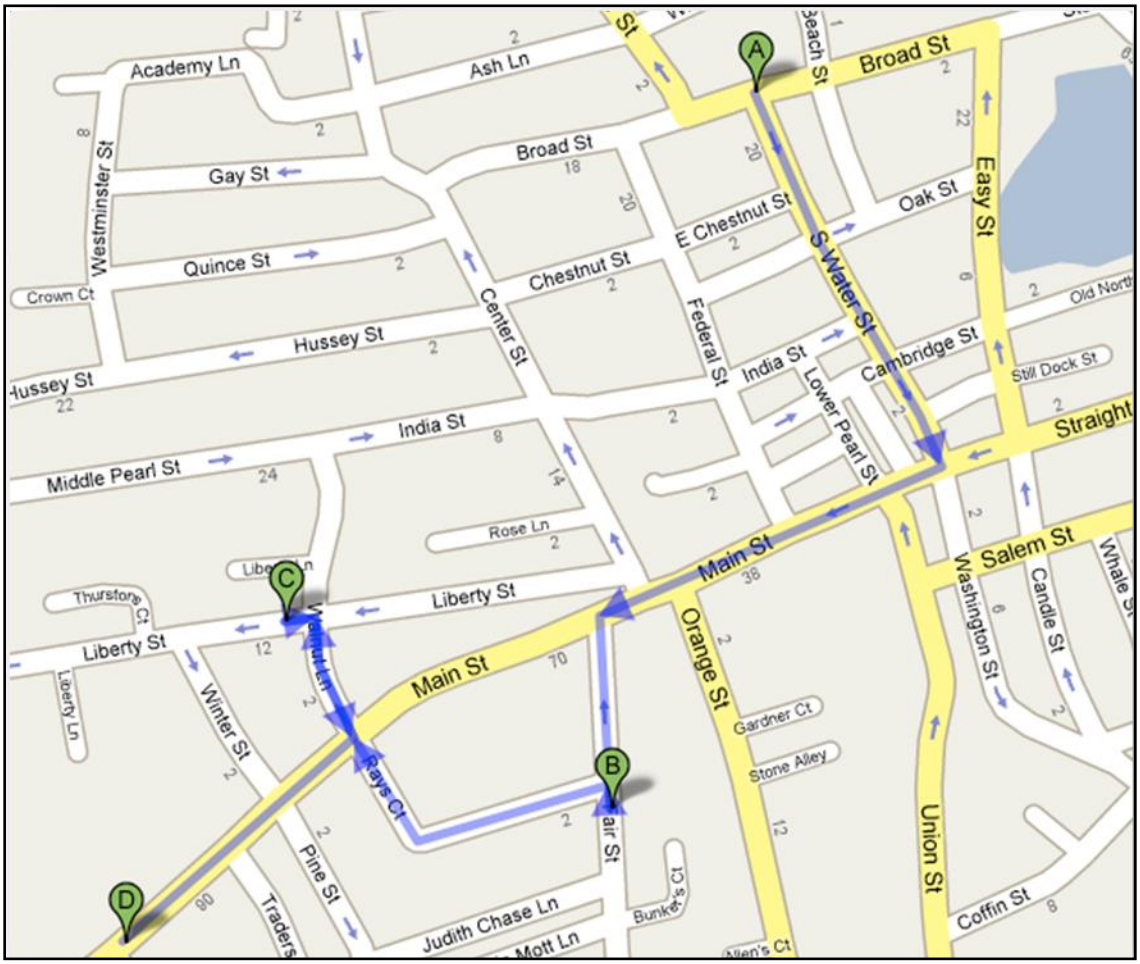


Figure 30 Prototype tour map

Appendix S Prototype Testing Observations

First Walkthrough with IQP Group

- Start 10:14
- Person A was only individual on speakerphone
- Person A was not interested in group dynamic
- Group collectively noticed Orange Street sign
- Found Fair St. without problem
- Had problems indentifying Quaker Meeting House / Research Library
- Note: Ray's Court under construction
- No sign for Ray's Court
- Confused by Quaker Meeting House and Research Library being attached
- Group was distant from the sites, staying on the sidewalk
- Person A noted "likes how he speaks slow" in reference to Erik's segment
- Person B noted that she couldn't understand the names of the three Quaker sects, but was interested in knowing them
- Person B nearly forgot about stop 2 because the two are at the same place
- Person C noted that Erik's segment sounded "sleepy"
- Person C also noted that the "numbers make me go in order"
- Person A went back to Main Street after stops 2 and 3, but rest of group went via Judith Chase Lane
- Person A had difficulty reading Walnut St on the map
- Person B noted that she "liked getting lost" in reference to going long way via Judith Chase Lane
- Person B also noted that she "couldn't figure out feedback" line when using it the first time (got it to work on the second attempt)
- Person C was confused how the group got from Judith Chase Lane to Macy-Christian House, but said she was bad with maps
- Person B and C noted that there should be "more signage," and rest of group agreed
- Person A was amused by dog in truck
- Person A also noted that he "can't tell which is wider" in reference to the Hadwen House audio segment describing the Hadwen House as the wider of the two
- Person C wanted to go into the Hadwen House after tour was over even though building closed at that time (stated in a somewhat joking manner)

Second walkthrough

- Started at 2:06
- Missed Ray's Court and proceeded to Judith Chase Lane, then went back
- Lots of Background noise due to construction on Ray's Court
- Noted that Bluetooth might be a problem with audio quality (also attributed to construction)
- Noted that introduction audio segment should include information about the feedback line
- Also noted that people might forget their initial thoughts by the end of the tour

- Noted that the segments "really makes me want to go inside" and that he "got a little taste, wanted more"

Notes from table sitting on Saturday December 6th handing out flyers

- Hard to get people who were leaving because we had to strike a balance between not interrupting people going to the museum and the festival of trees vs. taking the tour
- Hard to determine who walked in, but didn't want to visit the museum before they left
- Also noted that we might have missed people might have left through the gift shop
- Thought that people might be put off by the lack of content in stop 1, the Whaling Museum, since it is just an intro, and the first stop they would listen to
- Good number of people intrigued by the idea of the tour
- Some museum visitors run right out the door after they are done
- People who recognized the WPI logo on the take took greater interest

Fourth Walkthrough

- Person G amused by Andrew's voice.
- Person G disappointed by lack og information about the Whaling Museum
- Person G wondered about the possibility of a phone charger/rental phone
- Person G surprised and enjoyed the return greeting. "It's like they like you!"
- Person G missed walked past the Quaker Meeting House, even after seeing the sign for it.
- Person G looked through the windows to try to learn and see more.
- Traveled off the map and explored sites not on the map, including Fire Hose Cart House, Greater Light, and Old Gaol.
- Wanted more enthusiasm from the speakers, especially at sites 6 and 7.
- When explained about Doug and the difference between 6 & 7 and 8, suggested, "Tell Doug to have fun with all of them."
- Walked around Greater Light, taking in the house and the landscaping
- Person G ignored the route and site order and freely wandered around between sites.

Appendix T Exit Survey Comments

What follows are the verbatim transcripts of the written feedback on the tour survey.

1. IQPeer
   1) I enjoyed it because I know you but otherwise I wouldn't do it by choice.
   2) I would have gotten lost and/or sidetracked and not completed the tour.
   3) I cannot navigate by use of maps.
   4) I wanted to listen but I learned nothing.
   5) I don't like Cellphones or calling people, especially automated lines, so more excitement would make it feel more personal and less tedious.
   9) Lack of enthusiasm and needs editing
   10) Short attention span
2. IQPeer
   2) Add a "neutral" option
   9) Somewhat
   9a) Unable to understand speaker
   11) Liked except long. Lost attention after 60sec. Noise of other tour takers. #5 too long, no time to really look at each house & its structure. NHA guy is a snooze, he needs to be EXCITED. #2 & #3 are connected not adjacent. #3 long but is boring. #3 somewhat long decided to take pics. Reading ok but annoying sometimes. Honestly it doesn't stick in memory, I blame boring guy. Better signage at location, either on house of stop here.
3. IQPeer
   11) Monotoned speaker: needs more enthusiasm
4. IQPeer
   4) Because already had walking tour
   11) Narrator needs to be excited when talking and clear at the same time. Some houses didn't have a clear/big enough sign to notice if it was the right spot.
5. IQPeer
   11) The speaker was very difficult to listen to. The map was hard to read.
6. Advisor
   11) Would love to see more sites. I wanted more info too – perhaps in a second segment. I liked the ease of use and clarity of narration. Where was Patrick Stewart?
7. NHA Interpreter
   8) I've never done a walking tour – indoor tours have had greater detail (obviously)
   9) Erik – very clear. Other – less clear.
   9a) Words too fast/diction not as clear
   10a) I think it would be especially useful for site where you can't go in (Gaol, Fire House Cart House, Greater Light).
   11) Esp. liked what was said about Hadwen – gave enough info, but left listener with desire to hear more stories about the family. Quaker Meeting – I'd like to have just a little bit of what is included in the tour – enough to "whet" one's appetite.
8. Snowball User
   11) Great Idea, easy to use and very convenient. Liked to be able to do it at my own time and pace.
9. Snowball User
   The idea of a guided tour such as this is a good one.

I don't, however, like the cell phone aspect:
It is much more difficult to hear than an ipod would be.
I was not able to skip ahead to the next site without hanging up and starting all over again. If you miss something, you can't jump back a few seconds to repeat.
Cellphones don't block out street noise or people talking around you.

A podcast could show illustrations of moments of history associated with that building, or interior views to make the viewer more likely to go inside the building.

The scope (NHA only) is too narrow. In between NHA sites is a wealth of historical information and points of interest. The tour should include everything you see along the way, including the trees, gardens, and cobblestones. This would still fall within the mission of the NHA.

Map can be shown on screen on many ipods.

Length of segments probably about right, but needs to be read with more emotion and flair, and made more interesting.

If you don't make the best podcast tour you can, with music and illustrations, a lively narrator, and complete coverage of everything you pass along the way, someone else will make a better one.

If the podcast includes video and stills, people will also watch it from anywhere in the world, either on their computers or ipods. You can create a program that will work well, whether you're here or not. Why limit yourself?

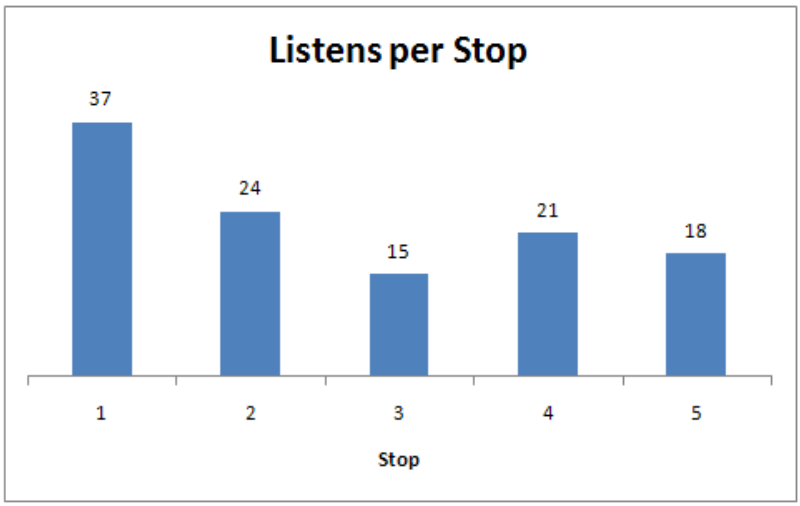
10. NHA Staff
    11) I learned many new things! The pace & "quality" of the presenters' voices is important. Content was great!
11. IQPeer
    6) "Maybe" depends on total length of tour
    7) Research library was too long/ spoken too slowly
    11) Very good to give me a brief understanding of each site, so I can decide which locations to enter. This would save frustration and money. So I don't pay to tour above (locations) that I really have no interest in. *Hadwen House was a little too long.
12. IQPeer
    11) I liked the handout and the overall tour. I think a few of the segments were too long and the Research Library was spoken too slowly. I also would not have realized that the Research Library and Quaker meeting House are attached to each other.
13. IQPeer
    11) Overall good – definitely expand to all sites. Some segments slightly too long/slow.
14. IQPeer
    11) I liked roaming around, without having a set place or time that I had to be at a site. If I wanted to I could go shopping, or walk down random side roads and then return to the

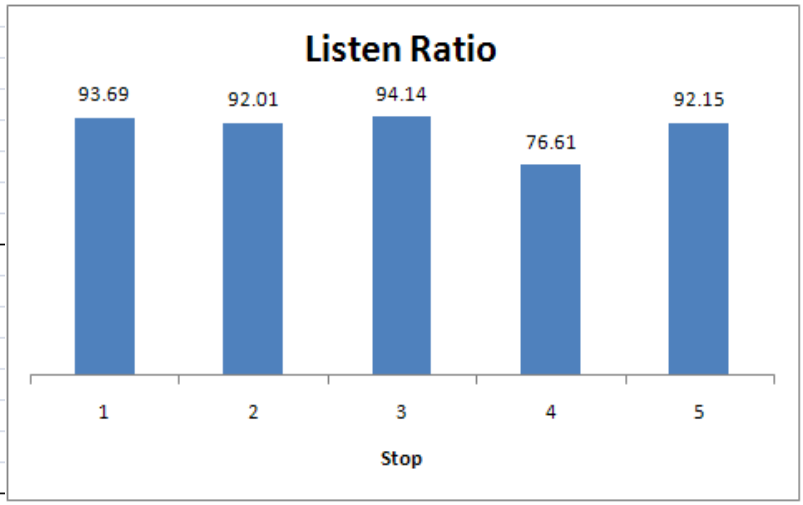
tour. It would be interesting to go on a walking tour with a person from the NHA in order to ask them questions. There were pauses in some of the recordings but overall it was good. Some sites were more boring than others. I liked the interesting stories, like selling a house for a dollar. I would like to see more sites, and more to look at at the site while listening. Good Job!

Appendix U Call Stats Summary

Caller Summary	
24	**Callers**
81	**Calls**
3.375	**Avg Calls Per Caller**
Listen Count Summary	
37	**Stop 1**
24	**Stop 2**
15	**Stop 3**
21	**Stop 4**
18	**Stop 5**
115	**Total Listens**
1.4197531	**Avg Listens / Call**
4.7916667	**Avg Listens / Caller**
Listen Time Summary	
0:12:08	**Stop 1**
0:31:17	**Stop 2**
0:15:32	**Stop 3**
0:30:34	**Stop 4**
0:36:46	**Stop 5**
2:06:17	**Total Listening Time**
0:05:16	**Avg Time / Caller**
0:01:34	**Avg Time / Call**
Listen Ratio	
93.69	**Stop 1**
92.01	**Stop 2**
94.14	**Stop 3**
76.61	**Stop 4**
92.15	**Stop 5**
88.16	**Entire Tour**
Duration of Each Segment	
0:00:21	**Stop 1**
0:01:25	**Stop 2**
0:01:06	**Stop 3**
0:01:54	**Stop 4**
0:02:13	**Stop 5**

Only Stops 1 through 5 were included in prototype testing





Listen ratio gives the percent of the each stop segment listened to. Calculated as:

(Total Listen Time for Stop) divided by
((Duration of Stop) times (Number of Listens for Stop))

Figure 31 Caller statistics summary

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