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Digital Media in the Tower

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Digital Media at the Tower of London

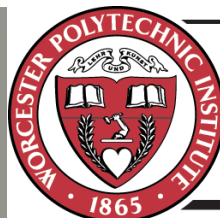
Recommendations for a Mobile Application at the Mint Street Exhibition



By: Michael Bartlett, Bryan Myers, Todd Pfizenmaier, Lauren Waring



Historic Royal Palaces
Tower of London



WPI

Digital Media at the Tower of London

Recommendations for a Mobile Application at the Mint Street Exhibition

An Interactive Qualifying Project Report

Submitted to the faculty of the

Worcester Polytechnic Institute

In partial fulfillment of the requirements for

Degree of Bachelor of Science

In cooperation with The Tower of London

On April 27, 2012

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Abstract

The following report evaluates the possible use of hand-held digital media in the Tower of London, specifically the Tower Mint Exhibition. Recommendations were created from visitor surveys, interviews with museum professionals, as well as, evaluations of digital media at other sites. Results show the implementation of an application adds value by letting visitors learn at their own pace, engage the whole family, as well as, share and extend their experience. These values correlate with possible characteristics for a successful application.

Acknowledgments

Our team would like to thank our sponsor, the Tower of London, for the exciting opportunity to work on this project at the Tower of London. We would specifically like to extend our thanks to Megan Gooch and Dominique Driver whose consistent support made this project possible. We would also like to thank all the members of the Tower of London staff for their support, insight and assistance with the project. Finally, we would like to thank our Worcester Polytechnic Institute advisors, Paul Davis and Kathi Fisler, for their generous advice and support throughout this project.

Executive Summary

With advancing technology, museums and heritage sites must find ways to keep up. Mobile applications play a major role in helping such sites bridge the technological gap. Many museums have a good idea of what they want to achieve with a mobile application, but, formal evaluations indicating how best to use them are limited.

Historic Royal Palaces has begun work on an innovative experience telling stories from the 600-year history of the Royal Mint at the Tower of London. The exhibition will focus on six key coins each of which each tell a specific story in the Royal Mint's history. In order to assist in creating an innovative and immersive experience, the Mint Street Project Team is seeking to develop a mobile application to supplement the Mint Street Exhibition. When looking into digital media implementation at the Mint Street Exhibition it is important to recognize the limitations. The Mint Street Exhibition currently has space, time, and popularity constraints, as well as a focus on Culture Families. Culture Families are defined by the Historic Royal Palaces Visitor Segmentation Model as families visiting the Tower for both the education and recreation of the children. The goal of our project is to evaluate how hand-held digital media can enhance the visitor experience within the constraints of the Mint Street Exhibition.

To meet the goal of our research project we developed three tools to help us gather data. These tools allowed us to evaluate the use of digital media at five museums and historic sites around London, survey for ownership of smart phones, comfort with and interest in digital media, as well as, technical sophistication of 144 visitors to the Tower. We then explored these topics and visitor interests through in-depth surveys with another 19 visitors. These assessments identified four ways in which a mobile application can add value to the visitor experience: permitting visitors to learn at the visitor's own pace, engaging the whole family, sharing the experience with friends and family, and extending the visitor experience via the internet.

Visitors to the Tower of London are well prepared for a mobile application. Overall, 76% of visitors to the Tower of London have access to a hand-held device, including smart phones and tablets. Additionally, 66% of Tower visitors enjoy participating in online activities such as

blogging, posting articles, uploading media, as well as, creating their own websites, and using social media sites on a regular basis.

A mobile application on Mint Street will be able to help visitors learn at their own pace. By allowing the visitor to choose how much time they would like to spend learning, the visitor does not feel rushed or feel like they have to take a specified route. Of the digital media our team evaluated at other sites, the digital media that were most appealing to the greatest range of people allowed for visitors to learn at the visitor's own pace using the media, device, or mobile application. As one visitor stated, "I really like the idea of using my own phone and going at my own pace." One way to enhance a self-paced learning environment inside the exhibition is through Wi-Fi integration. Wi-Fi allows more information to be available to visitors and provides the option to integrate more features into the mobile application through use of the internet. This also fits together perfectly with the space and time constraints of the exhibition because a mobile application would allow visitors to learn as much as they wish and take as much time as they want, without interfering with the overall flow of the exhibition. Overall, giving visitors the option to learn at their own pace will allow them to personalize their experience.

Since the Mint Street Project Team is focusing specifically on Culture Families a mobile application at Mint Street should be engaging for the entire family. From surveying we found that 93% of visitors were in a group of two or more, 49% were in a group of three or more, and of those in a group of three or more 39% had a child under the age of 12. In order to help target families it is important to recognize the need for the mobile application to be used by, and engage, multiple users on one device.

Culture Families were most interested in games and augmented reality in a mobile application, as shown in Figure 1. In order to provide the most fun, immersive, and engaging experience for Culture Families we believe that a Mint Street mobile application would create the greatest value by merging augmented reality and games. By doing this the mobile application would be covering a large number of Culture Families ensuring that those using it would be interested in the types of activities and interactions they are experiencing.

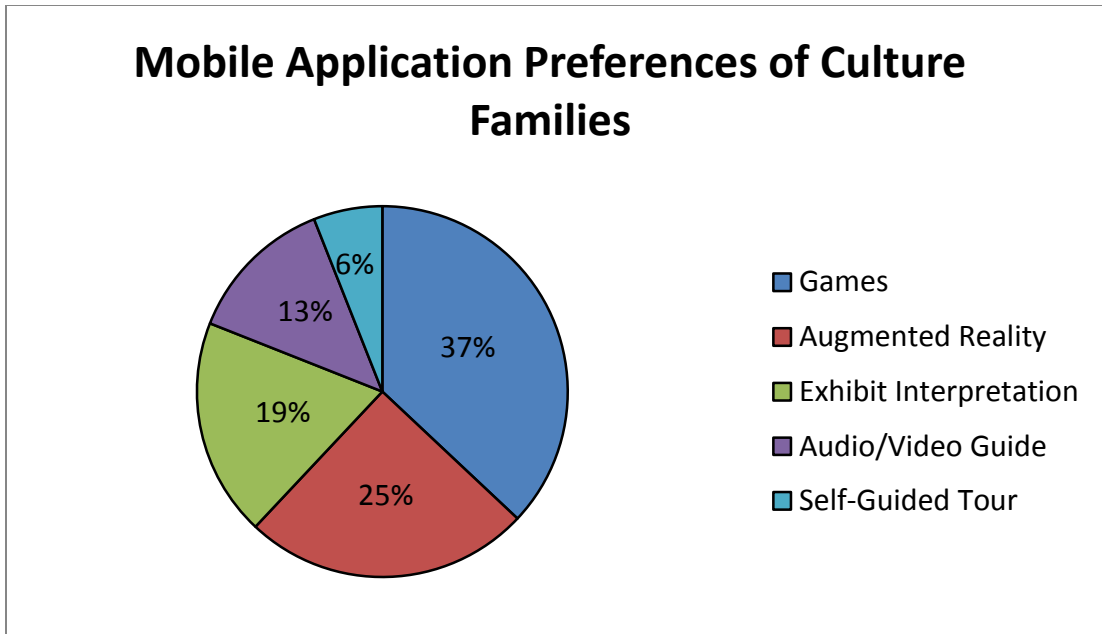


Figure 1 Mobile Application Preferences of Culture Families

A mobile application can offer visitors the opportunity to share their experiences at the Tower with friends and family. Of those surveyed 66% of visitors enjoy online activities such as blogging, posting articles, uploading media, as well as, creating their own websites, and using social media on a regular basis. The features which visitors use are shown in Figure 2. From this data the team can conclude some characteristics of mobile applications that these visitors might enjoy, such as, uploading pictures or a story, and having the ability to comment on content.

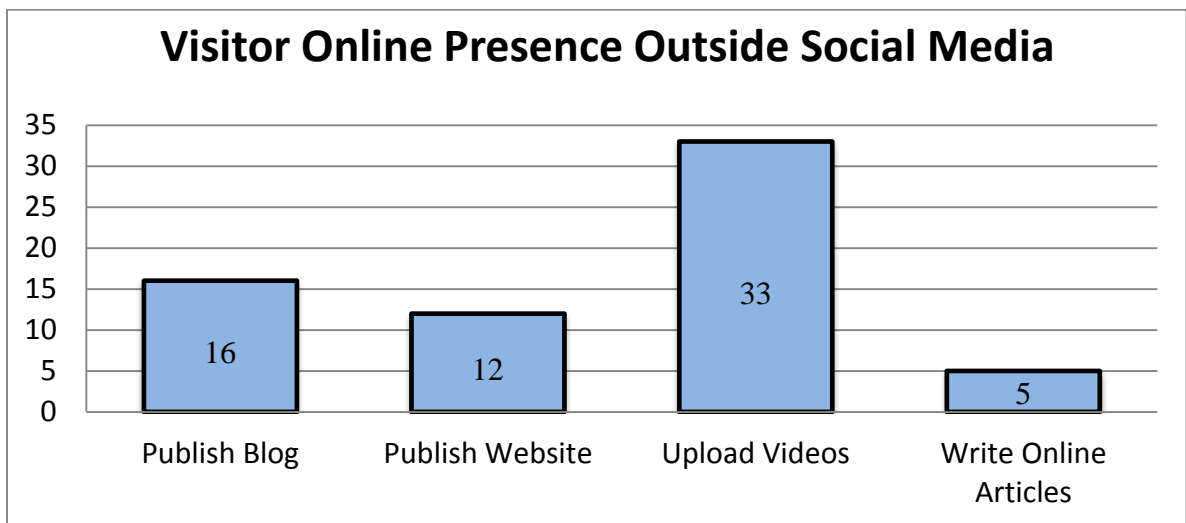


Figure 2 Visitor Online Presence Outside Social Media

The final added value that a mobile application would be able to bring to an exhibition would be the extension of the visitor experience. A mobile application that provides an opportunity to be used before, during and after visiting the Tower, would allow visitors to extend their experience for a longer period of time, even when confined to a small space, and short amount of time within the exhibition. Use of a mobile application following their experience on Mint Street would give visitors something to bring home, rather than their experience ending as soon as they leave. Our data shows that 35% of visitors planned to visit the Historic Royal Palaces website after their visit to the Tower, showing interest in getting more information at home. One mother from a Culture Family was quoted saying “I’ll probably visit the website later to reinforce the kid’s learning.” An extension of the visitor experience allows the exhibition to move beyond its size and time constraints while adding value to the overall visitor experience.

In our team’s recommendations, a mobile application would be a beneficial addition to the Mint Street Exhibition. In order to help meet visitor’s needs a mobile application can encourage visitors to learn at their own pace, assist in engaging the whole family, sharing the experience with friends and family, as well as, allowing visitors to extend their experience. The combination of an interactive exhibition and a mobile application will allow the Mint Street Project Team to develop an immersive and innovative experience for their visitors.

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1. Introduction

As technology progresses, digital media such as mobile applications, QR codes, social media, and augmented reality are being incorporated into museums and heritage sites. One of the aims of Historic Royal Palaces is to be “engaged in an extensive programme of change and development – in the way we present the palaces, help people explore stories, provide services and engage people’s senses. An important current initiative is to improve the experience we provide for families” (Historic Royal Palaces, 2011). Historic Royal Palaces is an independent charity, which runs not only the Tower of London, but also four other Royal Palaces in London. In order to adapt, Historic Royal Palaces strives to understand their visitors and develop new digital media to enhance interpretation, education, and engagement, at the Tower of London.

Due to staff interest in technology at the Tower of London, Historic Royal Palaces was awarded a ‘Creating New Markets for Digital Content’ grant from the Technology Strategy Board. With this grant, Historic Royal Palaces attempted to formulate a relationship with technology developers maximizing the potential of their historical and intellectual properties, specifically at the Tower. This will advance their goals as a heritage site, while also meeting visitor’s technological needs (Historic Royal Palaces, 2010).

By conducting a research project that gauged visitor experiences and needs, we determined how hand-held digital media adds value to the Tower, specifically the Mint Street exhibition currently in development. The curators plan to develop an innovative experience that tells key stories about the 600-year history of the Royal Mint at the Tower. The Tower staff have internally acknowledged the challenge of reaching visitors through technology with differing backgrounds and needs. In order to continue to improve upon their technology at the Tower and in the Mint Street Exhibition they chose to research their current visitors in order to best fit their needs.

To meet the aims of the research project the group sought to learn what other museums are doing with technology, what technologies visitors are comfortable with, and what visitors are interested in. The group conducted staff interviews at the Tower to assist in creating tools to assess visitors’ needs. To see how other sites are using digital media, the group created a tool called the Museum Evaluation Matrix, allowing the group to evaluate characteristics of the

mobile application, as well as, to determine what types of visitors would be interested in a mobile application. Using a Short Quantitative survey the group categorized the visitors, based on their current knowledge and use of digital media, as well as, gathered information on their access to hand-held devices. The In-depth Qualitative Survey, collected information on visitor's direct opinions on why they would be interested in using in a Tower mobile application. The team correlated the information and data received from the Museum Evaluation Matrix, Short Quantitative Survey, and In-depth Qualitative Survey to produce a recommendation to the Tower.

The combined data helped the group derive creative ideas for how a mobile application can add value to the visitor experience. The team then generated ideas for a mobile application at the Mint Street Exhibit while also creating recommendations for the Tower as a whole. Most importantly the group recognised the importance of extending the visitor experience, the ability to share experience at the Tower, giving the visitor a sense of freedom through a mobile application, and creating a fun, learning atmosphere for families. To deliver the conclusions of the data we also gave the Mint Street Project Team ways of incorporating these values as characteristics of a mobile application for the Mint Street Exhibition. These characteristics include features such as: a quest accompanied with augmented reality, an uploading feature, to upload pictures or stories, or a commenting feature. This information can be translated to the Mint Street Exhibition.

2. Literature Review

Museums and heritage sites across the world endeavour to keep up with and engage their visitors through technology. This section reviews the relevant literature on the recent use and development of hand-held digital media within the museum setting. First we assess the overview of today's museums and their rise of popularity, as well as, increases in visitor interaction with exhibits. Secondly, we examine the role of technology in museums in general, where it is being successfully incorporated, and how it is being implemented. Finally, we explore how technology fits in at a specific heritage site: the Tower of London.

2.1 Museums Overview

Museums have evolved and will continue to change along with the needs of society and advancing technology. The International Council of Museums defines a museum as a “non-profit, permanent institution in the service of society and its development open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment” (International Council of Museums, 2007). This definition states the exhibits of museums are there not only for education and study but also the enjoyment of the visitor.

In spite of all the increasing competition from other entertainment and cultural attractions, museum visitation in the United Kingdom and elsewhere continues to rise. In addition to increasing numbers of visitors, museums are currently the top “out-of home leisure experience in the world” (Dierking, 2005). Figure 3 illustrates the growing number of visitors in seventeen of the top visited museums in the United Kingdom. In order to maintain this trend, museums have to remain vibrant, relevant, and engaging places that people want to visit. Technology can and is playing an increasing role in helping museums bridge these gaps.

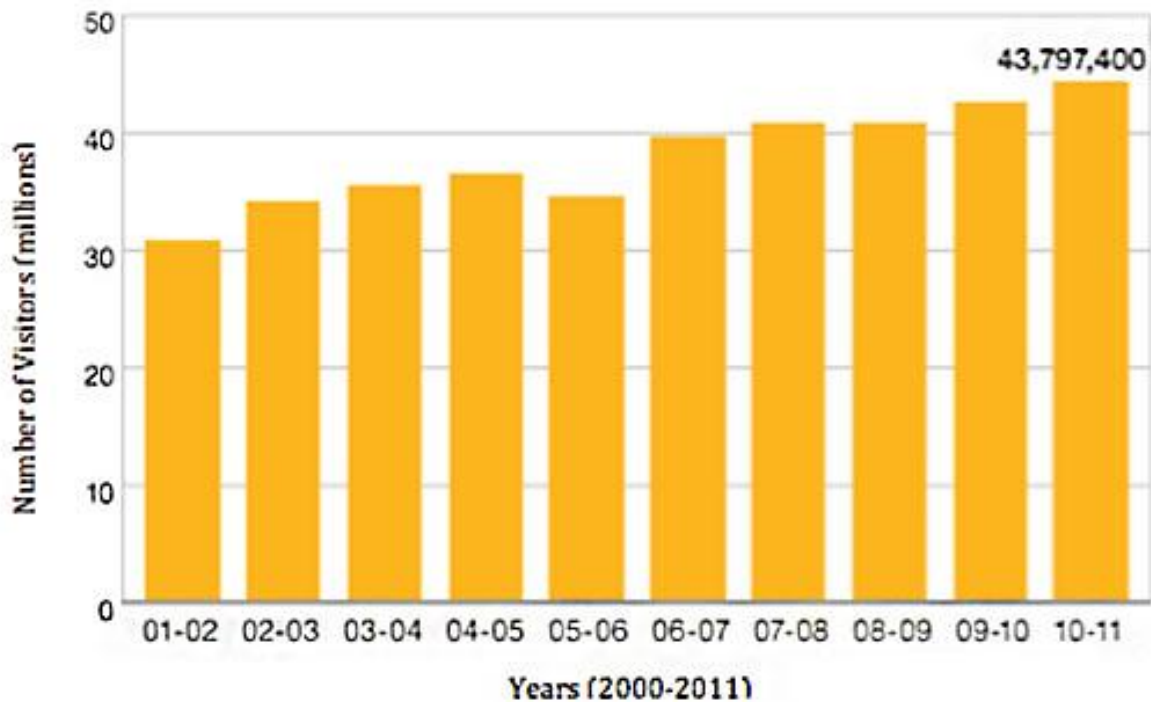


Figure 3 Number of visits at the seventeen most popular museums in UK (Youngs, 2011)

2.1.1 Motivation for Museum Visits

Increasing public awareness and prestige of museums has played a vital role in the rising number of museum visitors. The primary motive for museum visits is for a social or recreational experience; some visitors also look for educational understanding of the information that can be found in museums (Falk & Dierking, 1992). These appeal to the public and can be seen as a reason for rising number of museum visitors.

Ideal visitor experiences need to have the right balance of engagement and education. In order to enhance the visitor experience and make museum visits both enjoyable and educational, museums are looking to make the exhibits “hands-on” and “minds-on” (Hein, 1998). Museums realize visitors are now coming to museums for more than just a learning experience, especially because museums are competing with other leisure activities (Kotler & Kotler, 1998).

2.2 Scope of Technology in the Museum

In order for museums to be appropriate to today's society it is important for them to keep up with common trends in order to meet the visitors' changing expectations. It is important for museum staff to focus on how to implement changes that will satisfy both the goals of the museum, as well as, the expectations of the visitors (Tallon & Walker, 2008). By meeting the needs of both the museum and the visitor, both parties are satisfied with the outcome.

Hand-held digital media can be a useful tool in trying to meet visitor expectations. "The unique potential of hand-held technologies [can] be harnessed to meet these visitor expectations and thus deliver a more rewarding museum experience" (Tallon & Walker, 2008). This potential has drawn developers to hand-held media to generate individual experiences, thus giving each visitor a more meaningful, personal experience (Tallon & Walker, 2008). With visitor expectations shifting to a more personalized approach, museums are looking for ways to fulfil the desire of the visitor. Hand-held digital media is one of the methods, which museums are exploring.

Mobile media and gaming is one aspect of technology that many museums have examined in order to improve the visitor experience and meet the shifting needs of their visitors. With increasing numbers of mobile gaming applications and technologies "educational theorists and researchers are beginning to identify these tools as potentially powerful resources in supporting the development of learning communities" (Facer, Joiner, Stanton, Reid, Hull, & Kirk, 2004). Museums were once static learning environments; however, with shifts in how museums present information, there is a shift in educational thoughts as well.

2.2.1 Digital Learning

Museum experts are beginning to recognize that learning should not be accepted as the presentation of fixed knowledge to a passive recipient. Museums must provide the appropriate knowledge, in the right context, to appeal to the changing perspectives of visitors. Making visitors active learners allows them to absorb information through social means, such as conversations, communication, and control over their experience (Hawkey, 2004). Museums are

seeing a change in the way society functions and must make changes in the same direction to appeal to visitors.

In recent times there has been a split, between on-site and online learning, in ways which visitors take advantage of the knowledge that a museum provides (Hawkey, 2004). Learning has expanded farther outside the classroom, making way for more collaborative learning experiences (Ally, 2009). Online learning gives museums a pathway to potential visitors not at the museum. On-site techniques enable access to a range of digital resources, for example: games, photographs, projection presentations, audio, and video, which are designed to meet the educational needs of museum visitors (Hawkey, 2004). On-site learning presents visitors with a variety of objects, exhibits, interactives, and other engagements. The traditional museum experience makes use of on-site learning. With the rise of the internet, it was only natural that museums would provide online experiences to reach visitors at home as “Mobile learning through the use of wireless mobile technology allows anyone to access information and learning materials from anywhere and at any time” (Ally, 2009). Learners gain more control over what, where, and when they learn based on the availability of mobile devices. As Hawkey mentions, this is due to the diversity of online approaches, ranging from informational encyclopaedia-inspired learning experiences to simple games, which may not have any underlying educational influences. The internet and its effect on the way society learns have had similar effects on museums.

Providing a personal visitor experience is the future development of the museum visit (Hawkey, 2004). This makes people active participants in museums, rather than passive consumers (Simon, 2010). Personalization comes with incorporating technologies that visitors want to use. Significantly enhancing social and intellectual inclusion of technology in museums and heritage sites can make visitors active participants in exhibitions.

Webcasts were a form of technology used early in the life of digital media as a way to provide an on-site kind of experience to an online visitor. This approach provides a realistic dimension to the digital media and can create a personal experience with offsite visitors with more of a conversational feel (Hawkey, 2004). Although very different, the two types of visits do show how technology and digital media are influencing many aspects of museums, with clear overlap between the two.

2.2.2 Fixed and Interactive Technology

Traditionally, the typical approach to satisfying an exhibit's needs in museums is to add wall texts, object labels, and audio guides, providing exhibit specific interaction or museum-wide experiences. In some cases, visitors find it to have specific information just as they are standing in front of the work or exhibit. For years, the best way to provide the visitor with more information was to create some sort of audio guide device.

Technology can be used to help museums reach their visitors; however, it is just as important to have wide appeal and proper implementation. It was found in a study at the Victoria and Albert Museum that a blockbuster exhibition, those exhibitions that have appeal across the board, got up to 171,000 visitors, while an experimental audio exhibition received only 13,000 visitors (Victoria & Albert Museum, 2006). The visitor experience was not enhanced by just incorporating an audio technology; more steps must be taken to successfully incorporate digital technology. Personal hand-held devices, such as phones or Personal Digital Assistants (PDAs), have a much wider appeal in direct comparison with strictly audio devices. For example, at San Francisco Museum of Modern Art (SFMOMA), visitors under 40 were asked to rate personal versions of an audio guide on a scale of 1 to 7. There were two versions of the content, one a podcast for iPhones and iPods, and the other an MP3 playable on a phone, but both had the same content as the original audio tour. The research found that both the podcast and MP3 received ratings above 6.0, indicating the immediate appeal a hand-held device can have, as 79% of visitors owning one said they would be more likely to download an MP3 than rent an audio device (Samis, 2007). Personal devices are more appealing in the eyes of visitors because of their portability and familiarity with the visitors.

In a case study conducted at the heritage site Down House, the home of Charles Darwin, researchers assessed how both younger and older visitors responded to the use of the multimedia guide to make their way through the house and grounds. Down House was considering implementing a multimedia guide to reach a range of demographics but did not want to alienate a large portion of its visitors. Researchers feared that the use of “touch screen technology and multimedia format might hamper the experience of older visitors. (Petrie & Tallon, 2010)” Down House staff were surprised to find that the majority of visitors enjoyed the multimedia guide. As

shown in Figure 4, over 70% of all visitors to Down House preferred the multimedia guide over both guidebooks and audio guides (Petrie & Tallon, 2010). The majority of visitors had no aversion to the multimedia guide making it a successful tool. For evidence of visitor enhancement, Figure 5 shows that at least 64% of all visitors who used the multimedia guide would recommend it to a friend (Petrie & Tallon, 2010). Through knowing that such a large per cent of visitors would recommend such a guide to a friend, researchers we are able to infer that the guide enhanced the experience of that user in one way or another.

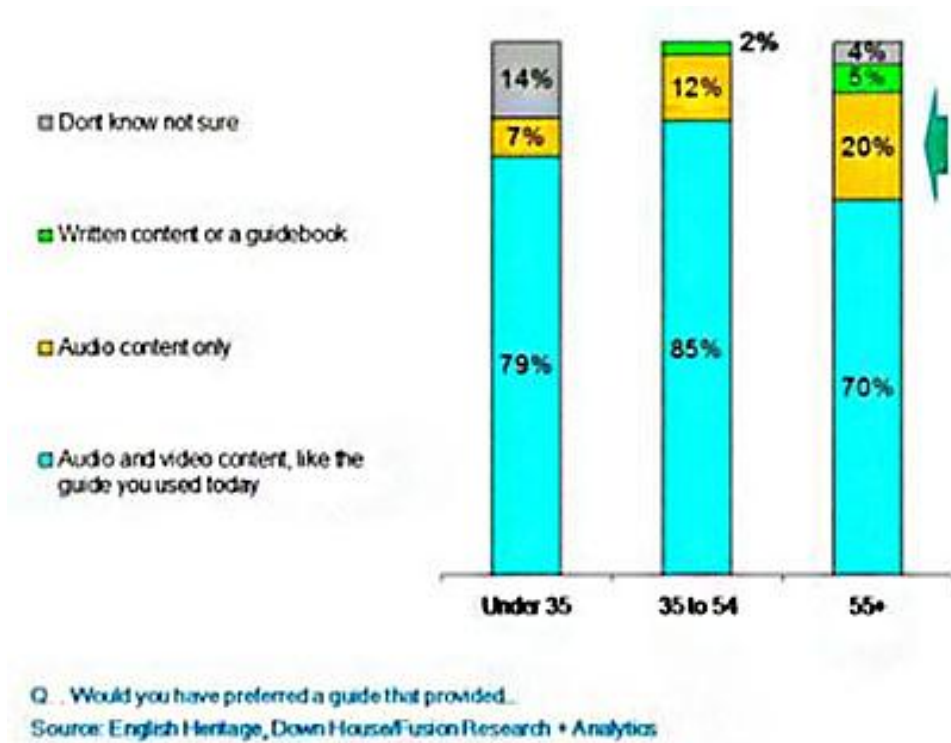
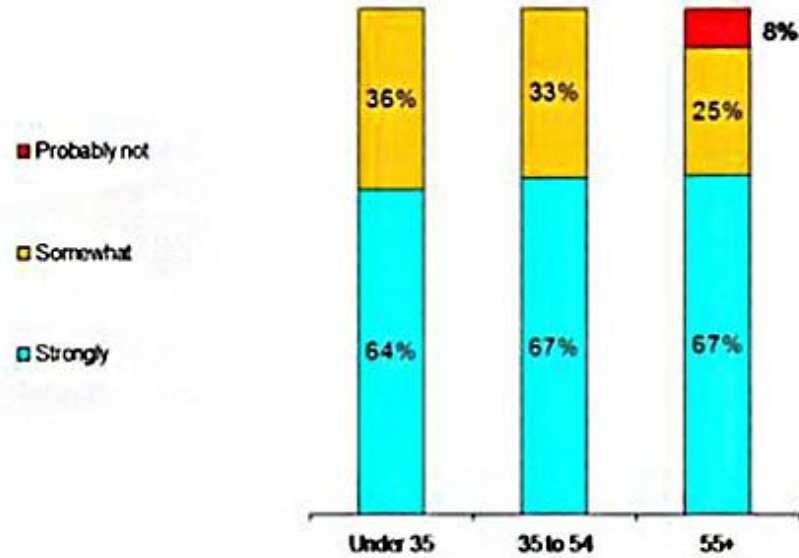


Figure 4 Guide Format Preferences by Age (Petrie & Tallon, 2010)



Q. Would you recommend this video guide to a friend?
 Source: English Heritage, Down House/Fusion Research + Analytics

Figure 5 Likelihood to Recommend Multimedia Guide by Age (Petrie & Tallon, 2010)

In another case study conducted at a heritage site, researchers attempted to see if audio guides were meeting the growing expectations of younger visitors. The study showed that, in general, visitors enjoyed the use of the audio guide, but there was also conclusive evidence that older people enjoyed using the guide significantly more. Figure 6 shows us the how likely visitors in three different age groups are to recommend using the audio guide to a friend. With only 50% of people under the age of 26 strongly recommending the mobile application and 87% of visitors aged 46 and above strongly recommending the mobile application, it is clear that the younger demographics groups are looking for more engagement in their visits (Petrie & Tallon, 2010).

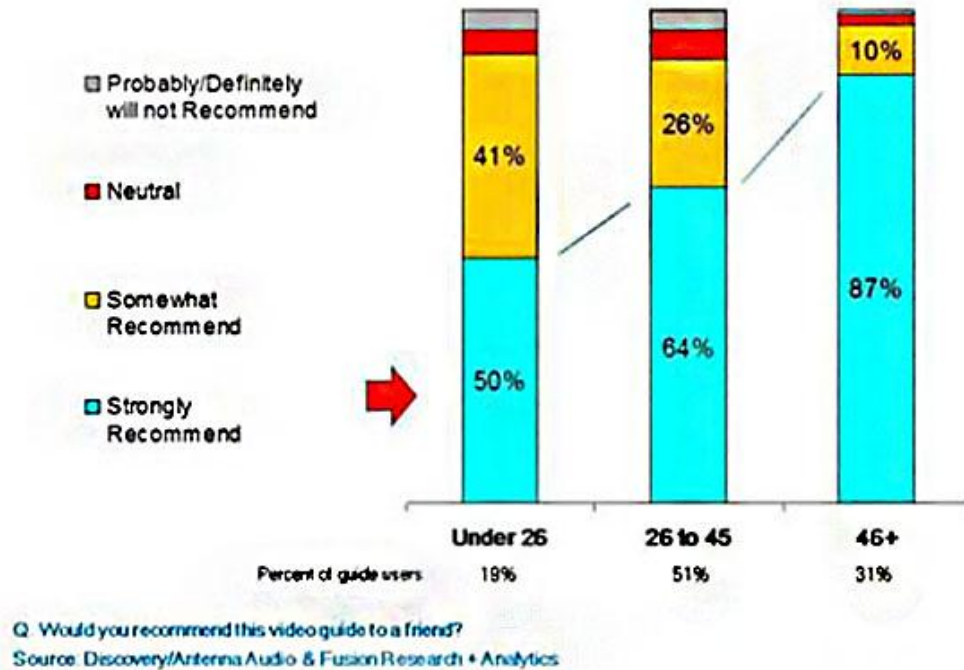


Figure 6 Likelihood to Recommend Castle Audio Guide (Petrie & Tallon, 2010)

Additional results, shown in Figure 7, provide evidence of younger demographics having increasingly higher expectations for their museum visits. From Figure 8 it seems a multimedia guide provides a better experience because it meets the advancing expectations of younger visitors while still being simple enough for older visitors to use and stay engaged.

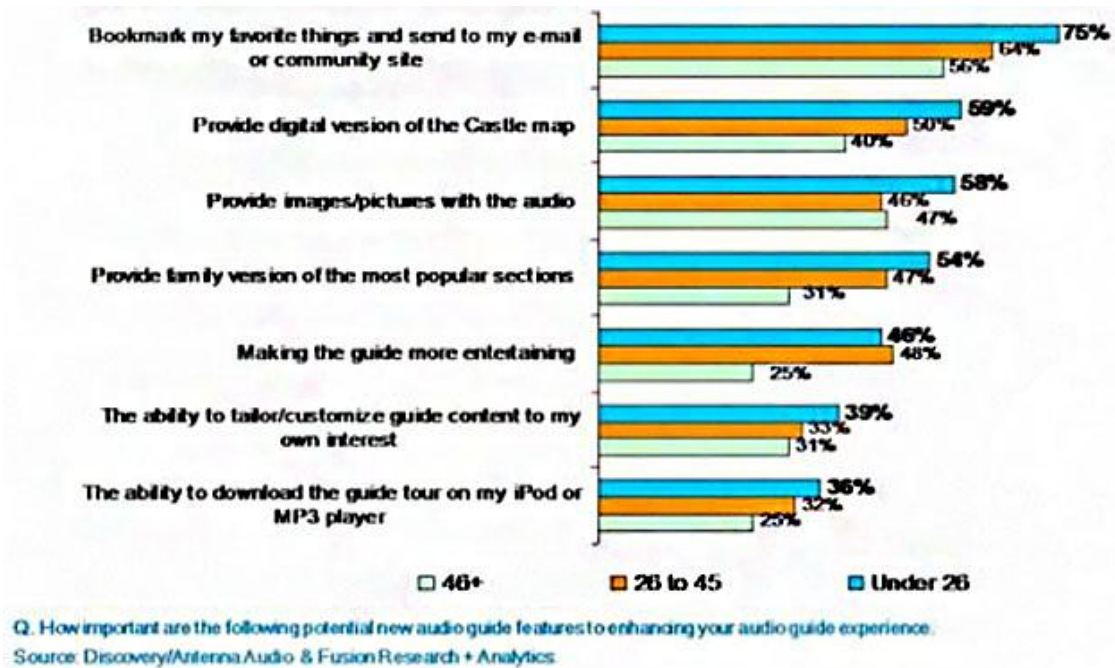


Figure 7 Importance of New Guide Features (Petrie & Tallon, 2010)

In 2010, more than two-thirds of US consumers had broadband Internet, nearly half owned an iPod or MP3 player, and ownership of smart phones was growing rapidly (Petrie & Tallon, 2010).



Figure 8 The Digital and Mobile Revolution (Petrie & Tallon, 2010)

With more advances in today's networked mobile devices such as smart phones, tablets, and Wi-Fi enabled media players, interactive two way media is on the rise (Proctor, 2011). These new technologies are being applied to new areas, such as education and learning. Museums now understand the importance of integrating modern technologies into their exhibitions. By incorporating mobile technologies, museums can promote and create mobile learning.

By classifying visitors into different categories, museums and heritage sites can gauge what types of technology their visitors will best respond to (Forrester, 2008). The Forrester Technographics Scale classifies people into six categories based on their use of technology: creators, critics, collectors, joiners, spectators, and inactives (Figure 9). *Creators* are classified as those participating in online activities outside of social media such as blogging, publishing websites, uploading media, and writing online articles. Those who used social media sites at least once a week are classified as *Critics*. *Collectors* use social media sites, but post less than once a week. *Joiners* include anyone who has at least one social media account, however, has never posted, commented, tagged, or liked anything. A *Spectator* is considered to be someone who uses YouTube as a Social Media Site but never has commented, liked, or voted. Anyone who does not have a social media account at all is considered as an *Inactive*.

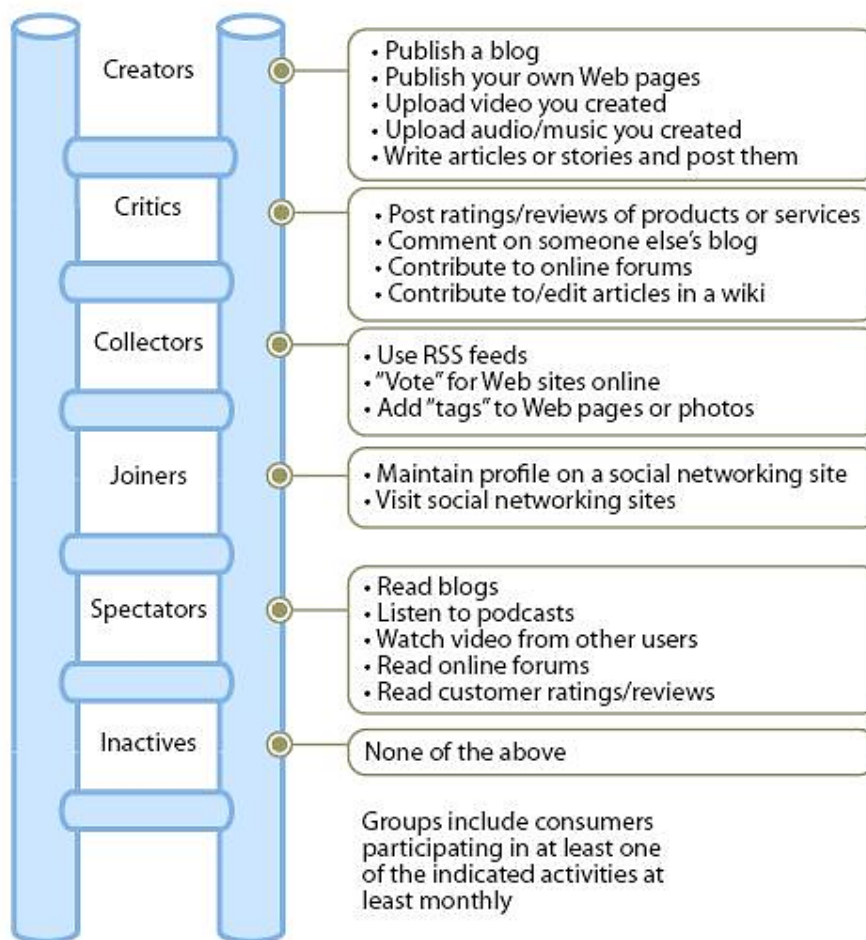


Figure 9 Forrester Technographics Scale; showing the different levels of Social Media Use (Forrester, 2008)

This scale can be applied to surveys to gather consumer data ranging from demographics to behaviours and attitudes towards social media (Forrester, 2008). This can be a vital resource to evaluate how the general public uses social media and how they want to see it applied to museums and heritage sites.

2.2.3 Exhibition Engagement

Prior to the study “Engaging or Distracting?” conducted at the Victoria and Albert Museum, there was concern among visitors that “interactives” would be distracting, intrusive, or patronizing. The researchers addressed the number, range, and integration of technology in the Victoria and Albert Museum. Specifically, they recorded the number of interactive exhibits, what types of technology were used (visual, low or high tech, and information based), and whether or not they were integrated into the actual exhibit. After extensive research, the researchers concluded that technology in exhibitions is, for the most part, not distracting when properly implemented (Victoria & Albert Museum, 2003). In a similar study, involving multimedia on a PDA or smart phone, visitors especially enjoyed the enhanced experience. Visitors said that the application on their smart phone was “as if they were there with a curator or informed friend” (Samis, 2007). The audio commentary guided their eyes, while the video provided interesting detail. The experience became more conversational, as visitors chose which content to access (Samis, 2007).

2.2.4 Mobile Device Capabilities

Mobile device capabilities are rapidly growing and becoming a major part of today’s world. Modern technology offers unprecedented mobility and the ability to receive information quickly (Proctor, 2011). Mobile applications can respond to data unique to the location or linking devices together for visitor interaction (Naismith, 2004). Museum access has increased exponentially through the use of these mobile applications and devices (Proctor, 2011).

2.2.5 Implementation of Mobile Technology

Museums have repeatedly turned to technology to meet the ever-growing demands of visitors (Tallon & Walker, 2008). However, museums must create mobile applications that

satisfy their missions and goals by being relevant to the exhibition, of good quality, and sustainable (Proctor, 2011). Once the museum feels that the mobile application can accomplish its goals, the museum must gauge visitors' interest in using the technology (Naismith, 2004).

Creating and implementing mobile learning in any environment accrues various expenses; from creating the software, hiring technical support, and upgrading the network to handling the added traffic (Naismith, 2004). These technologies, that many visitors already own and are familiar with, give museums a cost-effective route to meet visitor expectations (Tallon & Walker, 2008). Although the museum will not have to buy and distribute media players, applications are expensive to make. A typical iPhone application cost \$35,000, 21,626.39 GBP¹, to develop, and are classified as device native applications. Device-native applications have to be installed on a device but do not require internet to use, however, to run on a range of devices, multiple applications have to be developed (Forbes, 2011). Web-based applications work on a range of devices, and cost between \$10,000 to \$60,000, or 6,178.71 GBP to 37,072.25 GBP², to develop, however, they require internet access (Forbes, 2011). While mobile technologies are expensive to integrate, the benefits to visitors seem to outweigh the costs.

2.3 Goals of Historic Royal Palaces

One of the aims of Historic Royal Palaces is to be “engaged in an extensive programme of change and development – in the way we present the palaces, help people explore stories, provide services and engage people’s senses. An important current initiative is to improve the experience we provide for families” (Historic Royal Palaces, 2011). The goal of our research project ties in nicely with the overall aim of Historic Royal Palaces, “to help everyone explore the story of how monarchs and people have shaped society, in some of the greatest palaces ever built” (Historic Royal Palaces, 2011).

2.3.1 Technology in the Tower

In December 2010, the Tower of London launched its first iPhone application, *Escape from the Tower*. This is a “historically accurate, location-aware game,” which uses tracking

¹ Conversion rate taken from www.xe.com on 26/04/2012

² Conversion rate taken from www.xe.com on 26/04/2012

techniques to initiate different content to appear on the hand-held device (Historic Royal Palaces, 2010). Escape from the Tower attempts to keep the historical integrity of the Tower, by providing a new and modern take on navigating through a museum.

Another recently introduced program called Palace Explorers made use of tablet and QR code technology and allows United Kingdom Key Stage 2, ages seven to eleven to take part in “a seven week quest to release the Bookkeeper, a fictional character imprisoned at the Tower for losing all the great stories from the Tower Story Book” (Palace Explorers). While it is absolutely invaluable to have a program of this kind available to children, it just does not address the needs of the range of Tower visitors. A Worcester Polytechnic Institute project team is currently in the process of widening the appeal of the Palace Explorers program to families (Cullen, Feeney, Graedel, & Whittier, 2012).

Historic Royal Palaces would like to take the fun and interactivity that was produced by these programs and introduce it to a broader audience. Palace Explorers has been wildly successful with the school children, however, new target audiences have different needs (Cullen, Feeney, Graedel, & Whittier, 2012). Our research project will help Historic Royal Palaces accomplish these goals and identify the needs of different target audiences.

2.3.2 The Mint Street Project

The Royal Mint Museum and Historic Royal Palaces will open a new exhibition on the history of the Royal Mint at the Tower of London in May 2013. The exhibition will be placed on Mint Street, where the historic mint was located, to show ‘history where it happened’. Six key coins, and many other objects, will tell the 600 year history of the Mint through the themes of royal, political, and industrial power. The six key coins are from the eras of Edward I, Elizabeth I, Charles II, Sir Isaac Newton, and George III (Concept Brief for Mint Street at the Tower of London, 2012). Stories of these iconic figures will be told to reveal major events in the Mint’s history from the Mint moving to the Tower in c.1279 to 1812 when the Mint moved out of the Tower to a new factory at Tower Hill.

This collaborative exhibition will provide a family-focused visitor attraction that expands beyond the walls of the Tower. The exhibition will use multiple interpretive techniques

to spark visitors' imaginations by utilizing real objects, physical interactions, audio/video elements, and live interpretation. An interactive web element and other digital resources will support and extend the experience for the visitor (Concept Brief for Mint Street at the Tower of London, 2012).

3. Methodology

The project goal is to evaluate how hand-held digital media can enhance the visitor experience at the Tower of London, with reference to the new Mint Street Project, due to open in May 2013. In order to complete this project, our group established these objectives:

- Clarify how the Tower of London currently uses digital technologies and how it would like to apply hand-held media in the future.
- Assess the development and current use of digital technology in museums.
- Evaluate visitors' attitudes to, and uses of, digital media.
- Make recommendations on the use of a digital media at the Tower of London.

To achieve these goals our team used interviews and surveys to gather data on visitor use of digital media. Our group evaluated other museums' use of hand-held technology using a rating sheet based on criteria that we had established as important, known as our Museum Evaluation Matrix. The Short Quantitative Visitor Survey is used to segment visitors on their reason for coming to the Tower based on Morris Hargreaves McIntyre's (MHM) visitor segmentation designed especially for Historic Royal Palaces and researches how visitors use technology. Our In-depth Qualitative Visitor Survey is used to gather responses on how visitors use smart phones, applications, and how they would like to use them at the Tower. We combined the results from the surveys and Museum Evaluation Matrix allowing us to identify what types and characteristics of mobile applications visitors might like to see in a Tower mobile application, especially one relating to the Mint Street Project. This ties in directly with the project objective to evaluate visitors' attitudes to, and uses of, digital media.

3.1 Objective 1: Clarifying Current and Future Use of Digital Technologies at the Tower

Expert staff of Historic Royal Palaces described the current uses of digital technologies at the Tower and other Historic Royal Palaces sites, as well as, where they believe it can be applied in the future. In speaking with Megan Gooch, Curator of the Mint Street Project and our Project Liaison, we were able to identify the goals of and gaps in the Mint Street Project and where our project fits in. Through meetings and discussions with Dominique Driver, the Interpretation

Manager of the Mint Street Project and our other Project Liaison, we received information on exhibition interpretation, specifically the stories and characters she is trying to convey with the Mint Street Experience or Project. Wayne Halstead, the Tower Marketing Manager and Michaela Rogers Web Marketing and Development Manager gave us feedback on our visitor survey and information on survey protocols. Ina Pruegel Digital Learners Officer identified the important aspects of a mobile application to create an educational experience. Nigel Randall, Head of Information Systems, gave us valuable information on the implementation of hand-held technology, especially in terms of infrastructure, and pointed us to different mobile applications to evaluate. Using the input of these professionals we were able to adjust our Museum Evaluation Matrix and visitor surveys.

3.1.1 Identifying Interview Participants and Questions

After identifying the information needed to create a survey, our group identified different departments to interview. A table of the interviewees, their departments, titles, and the information we hoped to obtain through the interview are in Table 1.

Table 1 Information on Interviewees

Department Title	Expert Interviewed	Knowledge Gained from Interview
Marketing <i>Tower Manager</i>	Wayne Halstead	Valuable information regarding different surveys that have been conducted at the Tower in the past as well as why the Tower needs digital media.
Web Marketing and Development <i>Manager</i>	Michaela Rogers	Information similar to Wayne except with more knowledge of digital technologies used both inside and outside of the Tower.
Access & Learning Department <i>Digital Learners Officer</i>	Ina Pruegel	Valuable input on digital implementation at the Tower and the advantages and disadvantages she's seen in the past.
Information Systems <i>Department Head</i>	Nigel Randall	Knowledge regarding the information and infrastructure necessary to implement digital media at the Tower of London.

We were able to create questions for each interviewee by looking at their area of expertise and what relevant information they would be able to provide us. The questions for each interview are located in Appendix D.

3.1.2 Developing Interview Protocols

After reviewing several different types of interviews we decided to make use of the in-depth qualitative interview. The interview is fairly short and creates a comfortable atmosphere for participants to provide the optimum amount of data (WPI IQP Handbook). The in-depth qualitative interview takes no more than 30 minutes yet still allows for a rich, detailed exchange of information while maintaining a fairly informal, semi-structured conversational feel. The interviews were conducted in person with all team members attending each interview. One of the team members conducted the interview while the others took notes.

Each interview began with a preamble that explained the nature of the interview and stated the rights of the interviewee (see Appendix C). This gave the participant an assurance that their feedback was not used in a manner they did not consent to. These rights included the right to end the interview at any time, the right to skip any specific questions they choose and the right to confidentiality. We stated that if participants wished to maintain their right to confidentiality we would take all necessary steps to ensure their rights are satisfied, including the use of pseudonyms. At the end of the preamble we stated that by having read or heard the nature of the interview and their rights they are giving their informed consent to the interview being conducted, as well as, the fact that they have the right to revoke their consent at any given time, including after the survey is conducted. We then conducted the interview in the above stated manner, giving the interviewee ample time to answer each question asked. Interviewees were asked for verbal consent to use their names and the notes for the interviews in our report.

3.2 Objective 2: Assess the Current Use and Development of Digital Technologies in Museums

Our team reviewed digital media and mobile applications at other heritage sites and museums in order to gain a better understanding of how hand-held technology can be incorporated into the visitor experience. According to our guidelines developed by interviewing staff and from our literary research, we looked at how the museums and heritage sites implemented the technology, which visitors they are appealing to, and whether they are successful or not. Our group visited the Boston Museum of Science to establish important criteria for technologies in museums. We determined that it would be beneficial to both evaluate technology use in museums and heritage sites, as well as, ask some general questions to key staff members at these institutions.

3.2.1 Research and Observations

We developed criteria of key standards for hand-held digital media for museum and heritage site settings, which helped us formulate our recommendations to Historic Royal Palaces regarding the Tower. Based on our primary research and our previous visits to other museums, criteria have been broken down in our Museum Evaluation Matrix. As part of our initial list of criteria we classified the digital media in museums using the Forrester Technographics Scale, the promotion of the digital media, how it enhances the visitor experience, how easy it is to use, as well as, integration and implementation of the digital media within the museum. This was accomplished by assigning point values to the different criteria to classify the technology into the different categories. The classifications helped gather data on each institution that will be used in further analysis from our visitor survey.

From the recommendations of Megan Gooch, Dominique Driver, and from our own research, we developed a list of museums and sites to visit, and evaluated their current use of technology and digital media. We assessed:

- Science Museum, London
 - Atmosphere Exhibition

- Game SM
- Text SM
- News SM
- Who Am I Exhibition
 - Who am I
- Museum of London
 - Londinium
- Natural History Museum
 - Darwin
- King's Cross Station
 - Street Stories
- Tate Modern
 - Interactive
 - Artist Interactive

We used the museum assessment guide in Appendix H to gather data on each institution. By experiencing the technology as educated visitors we were able to observe which techniques work best to enhance the visitor experience. Additionally, we looked at the ease of use for visitors, keeping in mind visitors with little background in technology.

Through the recommendation of Dominique Driver we interviewed a New Media Developer from the Science Museum, as well as, members of the Natural History Museum Interactive Media team. Each gave us professional opinions on implementation of digital media in their respective museum or site (See Appendix E). Some of the questions we asked are:

- How is digital technology currently being used in the museum?
- What are some of the key advantages and disadvantages of digital media that they have found in previous endeavours?
- What would they like to accomplish in the future?

These interviews gave us more background on the technologies beyond what the visitor is able to see when they are using digital media.

3.3 Objective 3: Evaluating Visitors' Attitudes to and use of Digital Media

In order to assess visitors' level of comfort with and use of technology, we utilized two verbal visitor surveys. By surveying the visitors we hoped to quickly and effectively gather a large amount of data. The surveys were a questionnaire style. A Short Quantitative Visitor Survey was constructed with clear multiple-choice questions asking about visitor's accessibility to hand-held devices and their use of social media, as well as, other online activities such as blogging, uploading media, publishing websites, and writing online articles. The In-depth Qualitative Visitor Survey included questions on their social media use and online presence along with open response questions to gather visitor thoughts and opinions regarding digital media at the Tower.

3.3.1 Developing Protocols

We defined the necessary protocols which allowed us to save time and conduct fair and just surveys. We reviewed the protocols used by BDRC, market researchers for Historic Royal Palaces. Specifically, we reviewed how Historic Royal Palaces explained the survey purpose when eliciting visitor consent, identified preferred survey locations within the Tower, identified preferred sampling routines, dealt with non-English speakers, and people who were not interested in taking a survey. By adapting our own set of protocols from BDRC's, we were able to save time that would come with waiting for approval, thus giving us more time for conducting surveys.

We adopted a structured survey routine. Approaching visitors using our sampling frame, our group elicited consent from visitors to engage in our survey after reading the preamble to our questionnaire. Visitors were clearly told that the survey is completely anonymous prior to asking any questions. Our questionnaire was formatted such that we were able to conduct a large number of surveys in exactly the same manner, eliminating biased interpretation of data. This allowed us to compile the data and make generalizations about the visitors at the Tower. Many of the questions we asked in our survey served to provide statistics regarding Tower visitors (i.e. which smart phones people own and which mobile applications people use). This helped identify

associations between Historic Royal Palaces Visitor Segmentation and digital media use of visitors.

The survey process needed to be pretested and rehearsed. This ensured that we were asking the questions in the same way for every visitor to ensure the similar kinds of responses. We had to efficiently deliver questions to visitors and mark down the correct responses, in order to eliminate skewing of the results. The responses were collected on uniform sheets that the surveyor used during each survey. A Dictaphone was considered as a secondary way of collecting information; however, with strict time constraints the Dictaphone was not used.

3.3.2 Designing the Survey Instrument

We developed two surveys that allowed us to gather the information necessary to accomplish the goals of Historic Royal Palaces. The Short Quantitative Visitor Survey incorporated visitor segmentation, technology, social media use, and online presence classifications of visitors. This included basic demographic questions that asked visitors their age group, nationality, their reason for visiting the Tower, and their technology use (See Appendix K). We also had a longer In-depth Qualitative Visitor Survey, which contained many questions from the previous survey, plus another section that asked questions to help us understand how visitors might want to use a mobile application at the Tower (See Appendix L). These two surveys together helped us correlate Historic Royal Palaces' Visitor Segmentation Scale and the Forrester Technographics Scale, while also giving valuable feedback on how visitors would like to use hand-held technology at the Tower.

Historic Royal Palaces' Visitor Segmentation classifies visitors into one of seven categories: *Tick the Box*, *Time Traveller*, *Icon Seeker*, *Professional or Hobbyist*, *Escape Seeker*, *Leisure Family*, and *Culture Family*. Visitors falling into the *Tick the Box* category are defined as those visiting the Tower because it is a "must see sight". People who are looking for an experience that will bring them into the past are labelled as *Time Travellers*. *Icon Seekers* are most interested in specific characters associated with the Tower of London's history. *Professionals and Hobbyist* are interested in visiting the Tower for academic reasons rather than for pleasure. Visitors who are looking to get away from everyday life are classified as *Escape*

Seekers. Leisure Families come to the Tower because it is what their children wanted to do. *Culture Families* are looking for an experience that encourages their children's learning while also having fun (Visitor Segmentation Model, 2012). This correlated with the six levels of the Forrester Technographics Scale allowed us to get a breakdown of which visitors actively participate online.

The Short Quantitative Visitor Survey allowed our team to gather a large amount of data regarding how different segments of visitors use smart phones and technology. This showed where the majority of visitors fall on the Forrester Scale. The survey took three minutes to administer and is geared towards gathering data about visitors rather than their opinions. This gave us a lot of statistical information about Tower visitors that we can interpret and frame our recommendations to meet the needs of the Mint Street Project Team.

The In-depth Qualitative Visitor Survey allowed our team to observe trends that take place among different demographics regarding what they would like to see in a Tower mobile application. The survey consists of open response questions providing vital feedback on visitor thoughts and opinions. This allowed us to gather opinions of Tower visitors, which we could analyse and present back to Historic Royal Palaces.

3.3.3 Pretesting and Revising the Questionnaires

Before administering the questionnaires to visitors, we conducted an intensive pre-test to work out any remaining problems in the surveying instrument. The pretesting allowed our group to find any issues with the way visitors understood the questions, as well as, any problems with how smoothly the survey was conducted. After that, we took note of the problems and were able to fix them prior to the actual surveying. After adapting our survey based on feedback from Megan Gooch, Dominique Driver and other staff we pretested ten visitors at the Tower and other WPI students to finalize the surveying instrument.

3.3.4 Administering the Survey to Visitors

The surveying sample, in this case, was the visitors at the Tower of London. Our group implemented in person surveys to gather general visitor opinion towards digital media. Each team member approached selected visitors, asking him or her questions in face-to-face interviews, while manually recording the responses on paper. To ensure that the survey was done in an unbiased manner and given to a random selection, the same script was read to each respondent, we administered the survey on different days of the week, at different times, and in different parts of the Tower.

To get a random visitor selection for the Short Quantitative Survey we approached every fourth individual queuing at the Crown Jewels, not counting minors, or adults that were defined as staff either because they were wearing a staff badge or military uniform. However, for our In-depth Qualitative Survey we specifically chose to survey families in order to get data relevant to the Mint Street exhibition.

As defined in the protocols section above, after approaching visitors we immediately stated the nature of our research, allowing the individual the option to continue with the survey. Additionally, if the individual did not speak English, we excused ourselves from the situation, not attempting to conduct the survey. However, we made note of how many people we approached who were not English speakers. A record of those visitors who did not want to participate in the survey for other reasons was also kept in order to determine the total refusals. After finding a willing participant, we began administering the survey.

4. Data and Analysis

Our team collected data from four main sources described in the Methodology Chapter: Staff Interviews, the Museum Evaluation Matrix, a Short Quantitative Visitor Survey, and an In-depth Qualitative Visitor Survey. The staff interviews verified our project goals, helped us identify useful questions for our surveys, gave us mobile application ideas, and which museums to visit and evaluate. The Museum Evaluation Matrix collected information from other museum's and heritage site's uses of digital media in order to gauge what technologies are in use and assist in developing ideas for the Tower of London. The Short Quantitative Visitor Survey provides information on visitor's access to hand-held devices and their online presence. Finally, the In-depth Qualitative Visitor Survey gives information on how visitors feel about the idea of a mobile application at the Tower, as well as, what type of mobile application they would prefer to use there, i.e. games, audio/video guides, augmented reality, etc. The Data and Analysis chapter presents an organized summary of the data by summarizing findings and exploring trends in the data.

4.1 Museum Evaluation Matrix

The Museum Evaluation Matrix was used to evaluate the degree to which eleven forms of digital media in five museums and heritage sites would appeal to visitors from different levels of Forrester Scale digital literacy as described in the Methodology Section. Staff at the Natural History Museum and Science Museum were also interviewed to give us a new take on technology outside of the Tower.

4.1.1 Science Museum

We evaluated three separate examples of digital media in the Atmosphere Exhibit at the Science Museum. The first one we looked at was an interactive game station. The station permitted multiple visitors to use and play games simultaneously. The touch screen interface allowed for the user to choose from multiple different games, each focusing on a different area of what affects the atmosphere. The games themselves were simple in both playability and in the

educational content, with more focus on the game. In some cases the intended information was not easily interpreted and overshadowed by graphics on the screen and on the table in front.

The second example that we looked at was a touchscreen station. This implementation allowed the visitors to click through different informational text boxes, giving the user options for more detail or to email it back to themselves. We found that the text was sometimes too detailed, which might be intimidating for some visitors. Additionally, the only method of educating was plain text. There were no pictures or video to aid in the presentation of information to visitors.

The final implementation of digital media we analysed was a Tell-Station. This consisted of a physical keyboard and a large touchscreen panel. The visitors are first prompted to choose from a variety of different issues, regarding the environment and effects on the atmosphere. After choosing a topic, a short video clip appears on the screen with an expert giving a simple explanation of the issue, followed by individual responses. The visitor can then choose to read more text about the problem, formulate their own opinion, and then upload it for other people to see. Similarly, users can choose to view other opinions regarding the matter. We found the information is presented in an easily understood format, using various methods (text, video, pictures) to do so.

We then looked at the ‘Who Am I’ exhibit. It was comprised of multiple screens set into large structures. This made them appealing to use by giving the user options as to how they would like to learn, through short games, questionnaires, or videos. All were short enough that a visitor could complete them in under two minutes and move on.

4.1.2 Tower of London

We looked at the Tower of London’s application, called “Escape from the Tower.” In this mobile application visitors can help four characters escape from the Tower. The digital media focuses too much on obscure details about the Tower, as opposed to actually educating the user. Additionally, the mobile application can be time consuming and makes it difficult for multiple people to participate.

4.1.3 Museum of London

Another example of digital media we evaluated was an interactive touch table at the Museum of London. Visitors were able to sit down at a large table, and were given a stream of issues that London has faced in the past and present. After choosing a problem, the projector showed the problem both in a historical and present day context. Once the user finished reading the information, they were presented with a multiple-choice question on how they would handle the situation. After answering the poll, the percentages of what visitors answered were displayed. The exhibit displayed the necessary information without giving too much detail and engaged the visitors by adding their own opinions regarding the matter.

The Museum of London uses QR codes in many of its exhibits. They give the visitor the option to receive more information regarding a particular object, event, or exhibit. One example of a QR code was for additional audio. The audio was a first-person account of a particular event, with someone speaking as if they were living during that time period. Audio allowed the visitor to listen as they were walking to the next part of the exhibit. A similar QR code showed a dramatized version of the London Riots. Visitors, such as Time-Travellers (mentioned in the Methodology), might find it interesting to actually view particular events in history. The final QR code we analysed simply brought up more informational text for the visitor to read regarding an exhibit, however, text may only be appealing if the visitor is very interested. Overall, QR codes can be implemented in many different ways, with some methods being more successful than others.

4.1.4 Tate Modern

The Tate Interactive allowed the user to choose different pieces of art using a touch screen. The visitor could further choose if they would prefer to see how important other people rated the piece of art or they could chose to play a game involving the chosen art. The user could spend an extended amount of time at this station or they could end quickly.

In the Tate Artist Interactive the visitor can interact with a touch screen by choosing to watch videos of various artists. Each artist video shows the artist explaining and showing some

of their work. The interaction is limited to videos, with only one video per artist and no option for further information.

4.1.5 King's Cross Station

The mobile application 'Street Stories', used in the area surrounding King's Cross, allows the user to hear the history of the surrounding areas. If GPS is enabled on the device, it will automatically play the audio for the area you are walking near. When GPS is unavailable then the user had the option to manually select their location and hear the corresponding audio. The content was very educational and presented in an engaging style. The speakers were discussing the topic in a very conversational manner, as opposed to reading from a script, and the background historical noises immersed the user in the time period.

4.1.6 Natural History Museum

The Darwin Exhibit at the Natural History Museum uses digital media in a unique way compared to many other museums and sites. When entering the exhibit you receive a scan card which you can use at different stations throughout the exhibit. Using the card the user collects information by inserting their card into a slot next to a touch screen that allows them to choose topics they are interested in. This information is then stored on the card and can be used after their visit to learn more about the chosen topics. This allows users to continue their visit after leaving the museum, thus allowing them to spend as much time as they wanted learning about the exhibit.

4.1.7 Museum Evaluation Compilation

Table 3 shows the percentage of total possible points each mobile application or digital media device received. These rankings were established by assigning point values to the different criteria to categorize the technologies. The colours denote the percentage of total points that the media received. Blue denotes media that received over 55% of total points available, purple between 35% and 55%, and green less than 35%. This gives a representation of which applications or digital media appealed to each of the different classifications on the Forrester

Technographics Scale. The five applications most appealing to all the Forrester categories were: News Science Museum, Kings Cross, Londinium, Problems, and Darwin. Each of these allowed visitors to go at their own pace and choose their interactions.

Table 2 Museum Evaluation Data Summary

<u><i>Digital Media</i></u>	<u><i>Creators</i></u>	<u><i>Critics</i></u>	<u><i>Collectors</i></u>	<u><i>Joiners</i></u>	<u><i>Spectators</i></u>	<u><i>Inactives</i></u>
<i>Game SM</i>	8%	16%	22%	35%	39%	55%
<i>News SM</i>	42%	48%	56%	65%	68%	65%
<i>Text SM</i>	4%	8%	11%	17%	18%	30%
<i>Who Am I SM</i>	4%	8%	11%	17%	18%	30%
<i>Escape TOL</i>	13%	20%	30%	35%	40%	35%
<i>Londinium MOL</i>	38%	40%	44%	48%	46%	40%
<i>Problems MOL</i>	33%	44%	44%	48%	46%	40%
<i>QR MOL</i>	8%	12%	18%	17%	21%	5%
<i>Interactive Tate</i>	33%	44%	44%	48%	46%	40%
<i>Artist Tate</i>	13%	20%	30%	35%	39%	35%
<i>King's Cross</i>	21%	36%	52%	70%	82%	85%
<i>Darwin</i>	16.67%	28%	40.7%	52.2%	60.7%	60

4.2 Short Quantitative Survey

The Short Quantitative Survey received 144 responses, most of which were collected during the school vacation weeks. The sampling size is large enough to extrapolate some definitive conclusions about visitors at the Tower. The following results summarize the Short Survey.

Of the people approached 61% declined to take the survey, of that percentage, 18% declined because they could not speak English, and the survey was only administered in English. Those who were able to take the survey 26% did not speak English as a first language, shown in Figure 10. The category for ‘Other’ includes languages for which there were two or less respondents. All respondents however were required to speak English in order to take the survey. This shows us that a mobile application created only for English speakers would be a viable option.

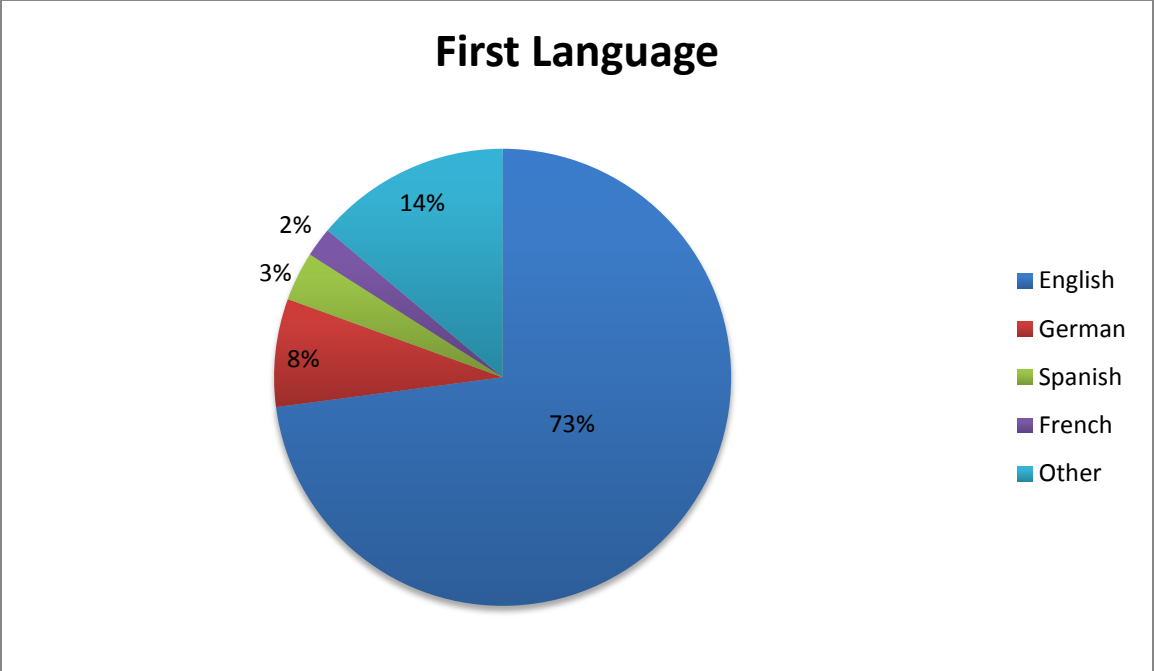


Figure 10 First Language

The ages of survey respondents are shown in Figure 11. The figure shows that visitors between the ages of 20-54 took the majority of the surveys.

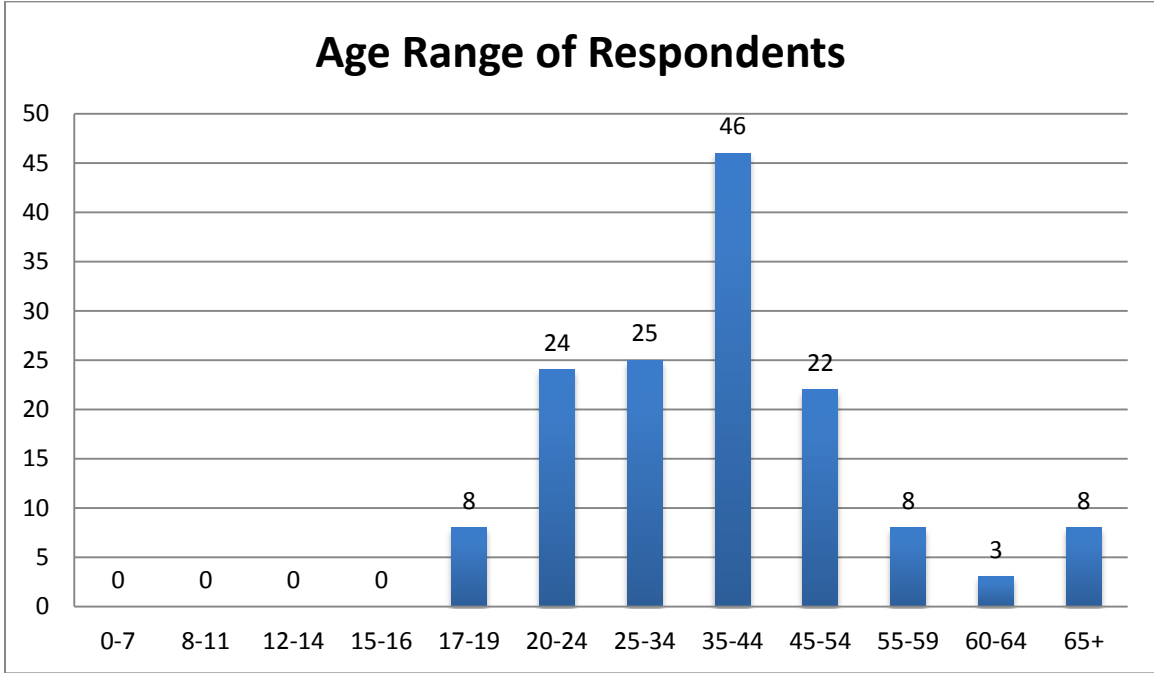


Figure 11 Age Range of Respondents

The Mint Street Exhibit is targeting families with children from ages seven to eleven. Of all of the respondents from the Short Quantitative Visitor Survey, 19% had children under the age of twelve. This is a good portion visitors at the Tower and are categorized separately to look more closely at the number of families coming to the Tower.

Group size was also examined to see if visitors are coming as individuals or as a group. The size broke down to 7% individual visitors, 44% in pairs, and 49% with three or more visitors in their group. The small fraction of individual visitors shows that many people visit the Tower with at least one other person, meaning a mobile application will have to accommodate for multiple users. Individual visitors would not have a problem viewing a mobile application on a phone or tablet. In a group of two it would still be fairly easy to navigate the mobile application and have both members of the party be able to take part in the mobile experience. Due to space and sound constraints a group of three or more people would most likely have trouble making it so that every member of the party can take part in the mobile application. Because such a large number of the visitor parties have three or more people in them there needs to be a way to allow them to get everyone involved in the mobile experience.

Visitors were asked about their access to a smart phone or tablet while at the Tower. Of the visitors surveyed, 76% owned a smart phone or tablet. This means that many visitors to the Tower have access to a hand-held device. Of the visitors that own smart phone or tablet 79% of visitors had their device with them during their visit. This was a concern for international visitors, but even they carry their hand-held devices with them on trips to the Tower. The types of devices are broken down in Figure 12. Of the visitors we surveyed that owned smart phones 64% owned iPhones/iPads and 22% said they owned Android devices. In order to cover the majority of visitors with smart phones a Tower mobile application needs to be developed for both iOS and Android.

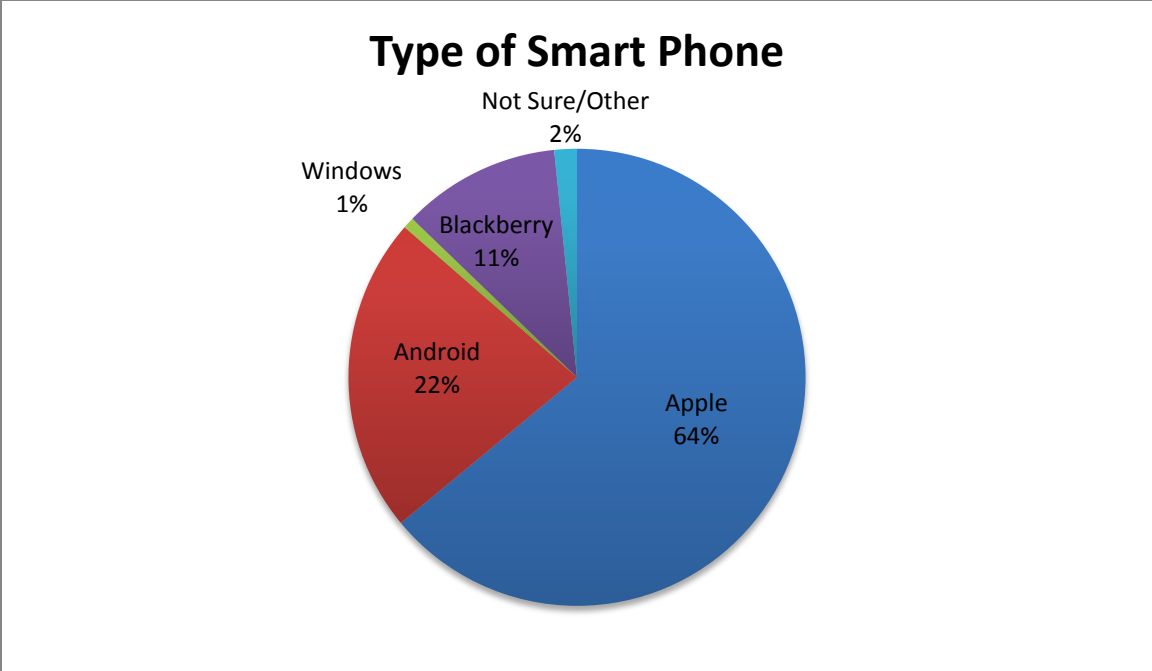


Figure 12 Type of Smart Phone

The vast majority of visitors have not used a mobile application at a museum or heritage site. The survey determined that 17% of the visitors with smart phones had used a mobile application at another institution prior to their visit. Based on input from our sponsor, Megan Gooch, we believed that less than 10% of visitors would have used a mobile application at a museum. This could be the start of increasing interest of mobile applications at museums; however, we do not have sufficient data to verify this assumption.

Smart phone owners are divided on where they would like to download a mobile application for the Tower. Show in Figure 13, 37% of respondents say they would like to download a mobile application at the Tower, 34% would like to download it elsewhere, and 29% have no preference. There is no single common trend of how visitors would like to download the mobile application.

Where Smart Phone Owners Would Like to Download a Mobile Application

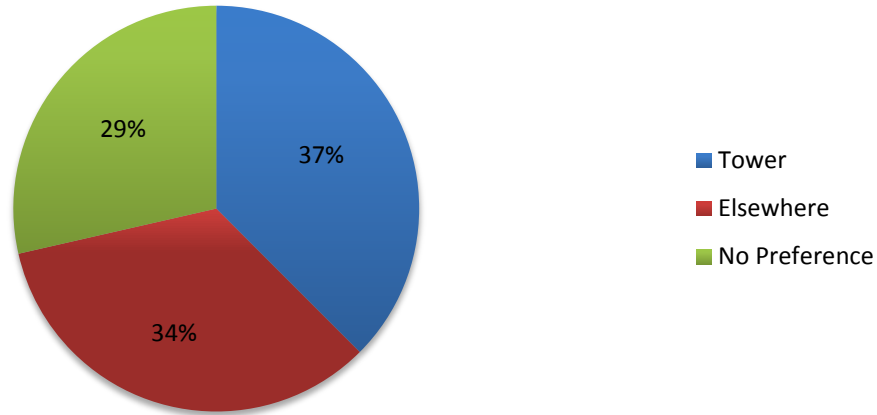


Figure 13 Where Smart Phone Owners Would Like to Download a Mobile Application

The respondents who said they would like to download a mobile application at the Tower were asked if they would like to use Wi-Fi or their own 3G network to download the mobile application. Shown in Figure 14, 75% stated that they would like to download a mobile application using Tower provided Wi-Fi. In order to meet the needs of the majority of the visitors a mobile application at the Tower would require a Wi-Fi hotspot at the very least if not Tower wide Wi-Fi.

How Smart Phone Owners Would Like to Download a Mobile Application at the Tower

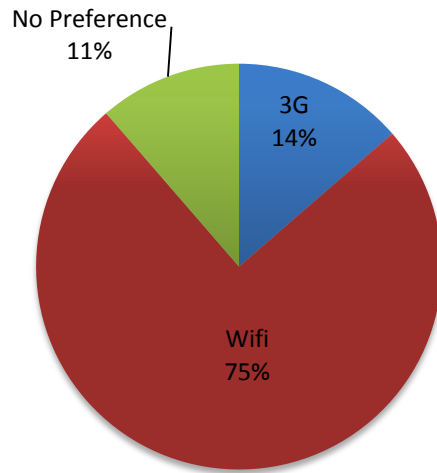


Figure 14 How Smart Phone Owners Would Like to Download a Mobile Application at the Tower

The country of origin of visitors gives us an idea of what they need to download and run a mobile application on their devices. As shown in Figure 15, about 77% of visitors are from foreign countries, meaning they are unlikely to have low-cost data access. This percentage coincides perfectly with the information taken from the interview with Wayne Halstead where he stated that roughly 80% of Tower visitors are not from the United Kingdom.

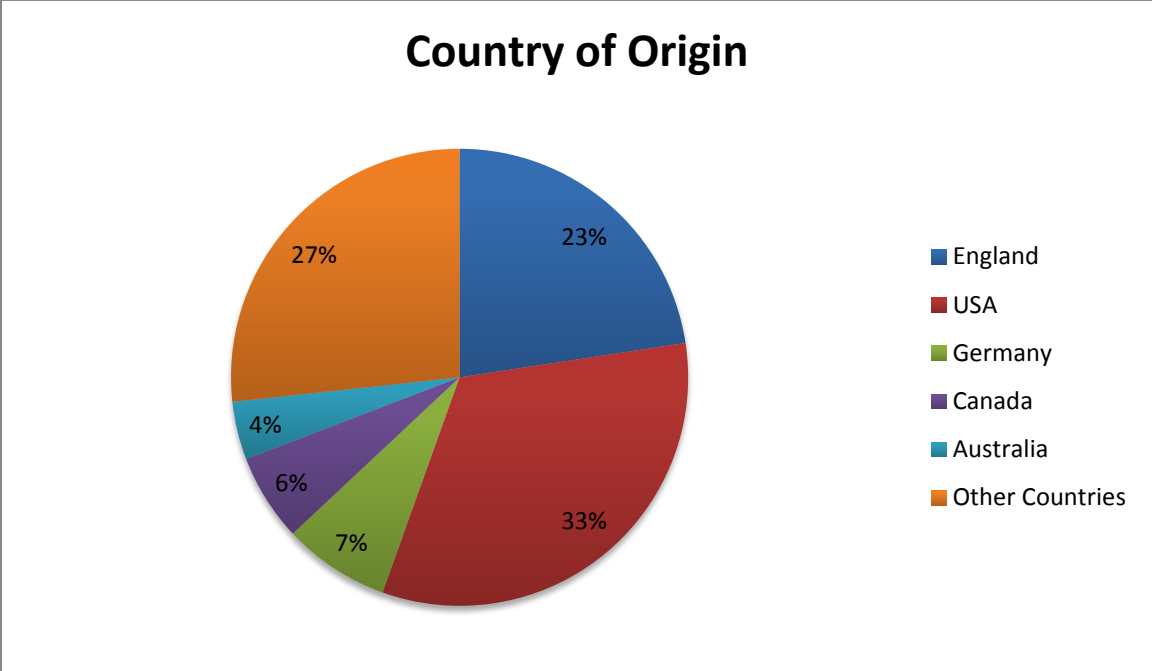


Figure 15 Country of Origin

The survey sought to rank and evaluate visitors on the Forrester Technographics Scale, as well as, the Historic Royal Palaces Visitor Segmentation Model, mentioned in the Literature Review and Methodology sections, respectively. In order to do this the visitors answered questions about their online presence. Our results show that 79% of Tower visitors have a social media account. Visitors stated which specific sites they used with no limit on how many they could choose. The websites they use are shown in Figure 16. The data alludes to visitors being very active online and on social media sites.

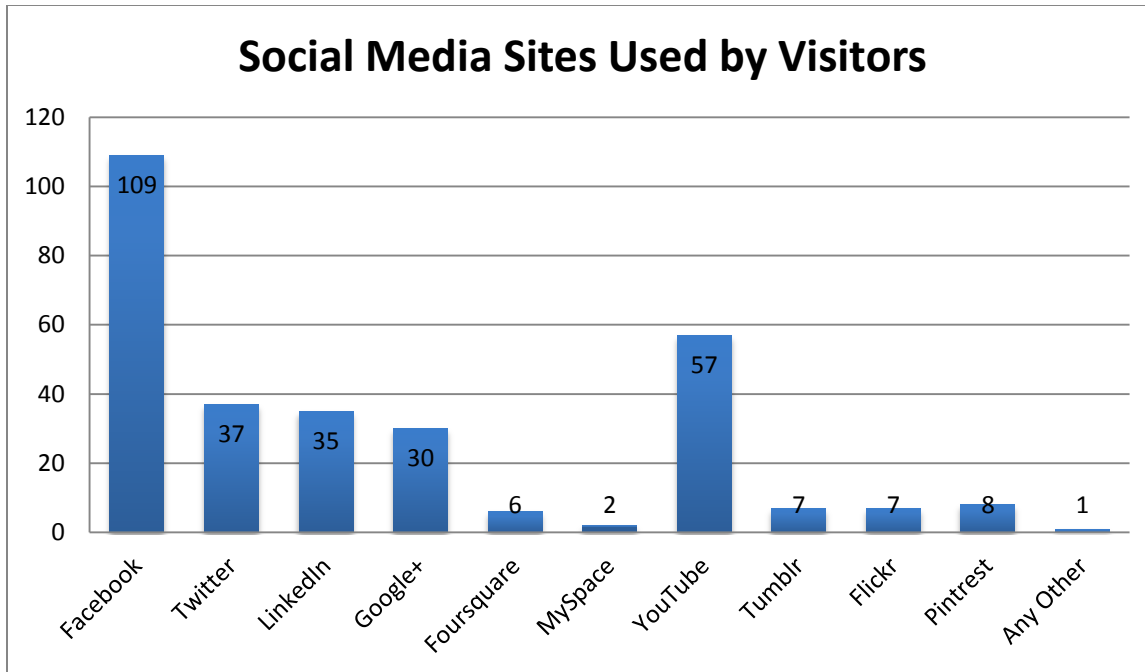


Figure 16 Social Media Used by Visitors

Furthermore, the visitors also stated if they posted on their social media accounts, as well as, how often. Our data shows that 83% said they use features such as tagging, voting, or liking. Many of the visitors are using the features that allow them to be more involved on the social media sites. Of the people using these features they have a varying degree of use, with most using it at least once a week, shown in Figure 17. This allowed us to place visitors into the Forrester scale, specifically the *Critic* and *Collector* categories.

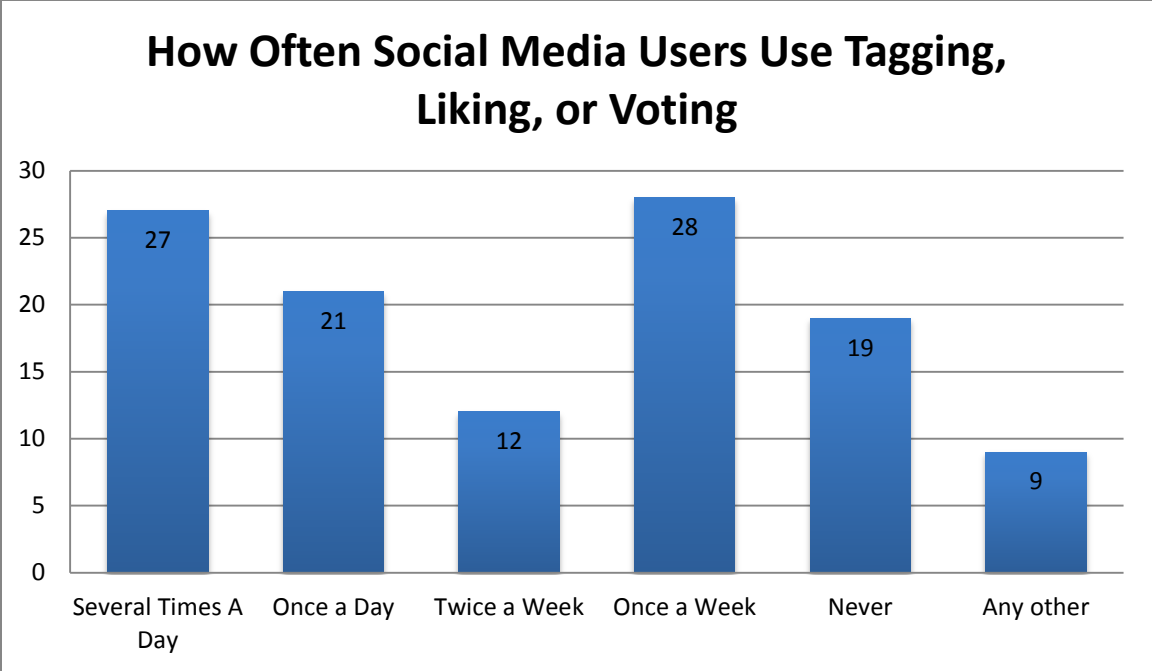


Figure 17 How Often Social Media Users Use Tagging, Liking, or Voting

Additional information about their online presence also helped segment the visitors. From the survey we found that 35% of visitors participated in activities outside of social media such as publishing blogs, articles, videos, or their own website. The number of visitors who engage in each activity is shown in Figure 18. Many visitors use the web to upload videos or other media types. Also shown in Figure 19, many are publishing them less than once a week. No one is publishing several times a day.

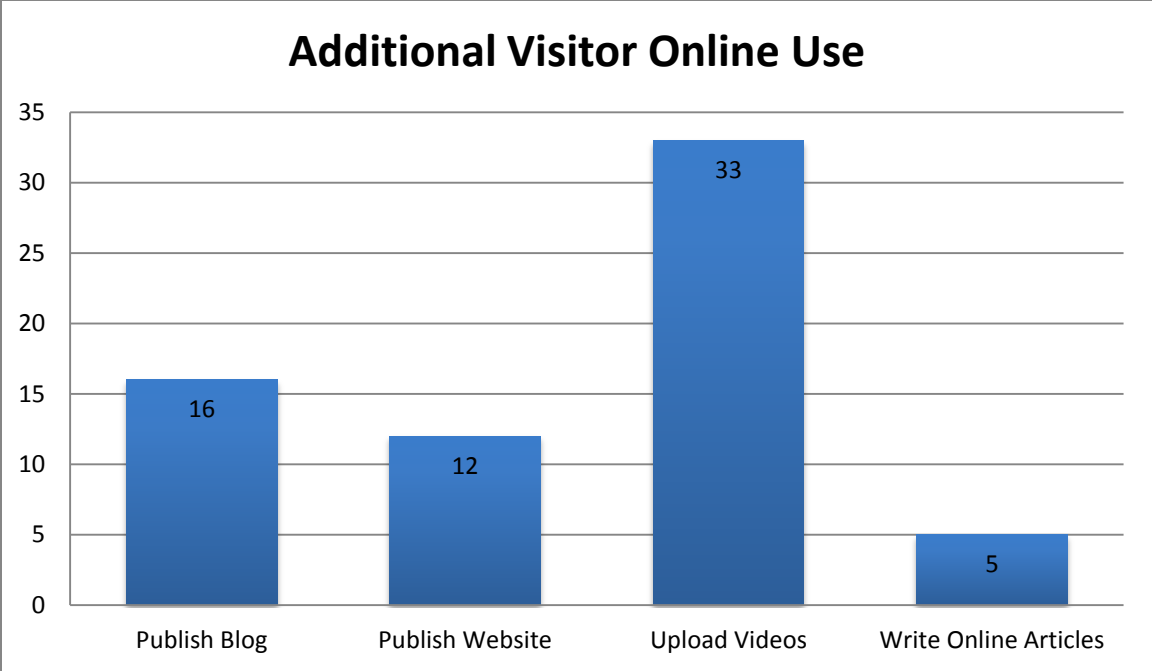


Figure 18 Additional Visitor Online Use

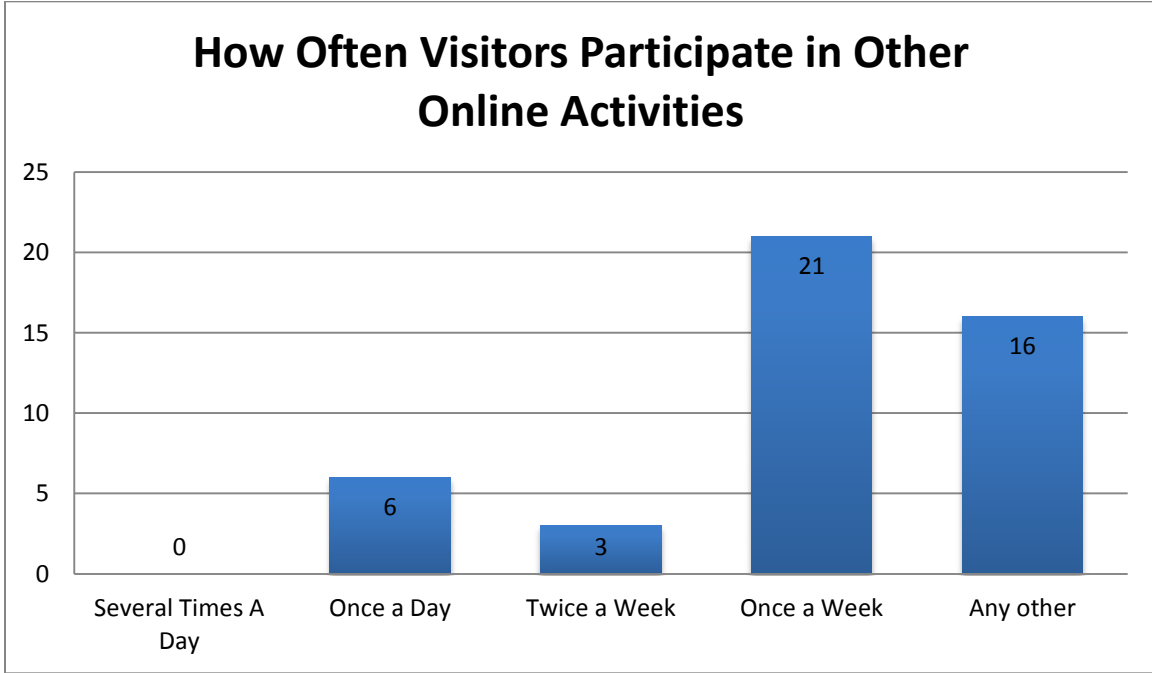


Figure 19 How Often Visitors Participate in Other Online Activities

When segmented to the Forrester Scale, as shown in Figure 20, many visitors coming to the tower are ranked as creators and critics, 50 and 45 respectively. There are also 28 of visitors

who are classified as inactive. This was broken down further to see where families fall on the Forrester scale. For groups with children under twelve, 18 of the 33 have a social media account and twelve use the voting, tagging, and liking features. Culture families are also quite active online with five of twelve being creators and only four being inactive. More than half of the visitors to the Tower of London engage in some form of social media, with many creating their own content.

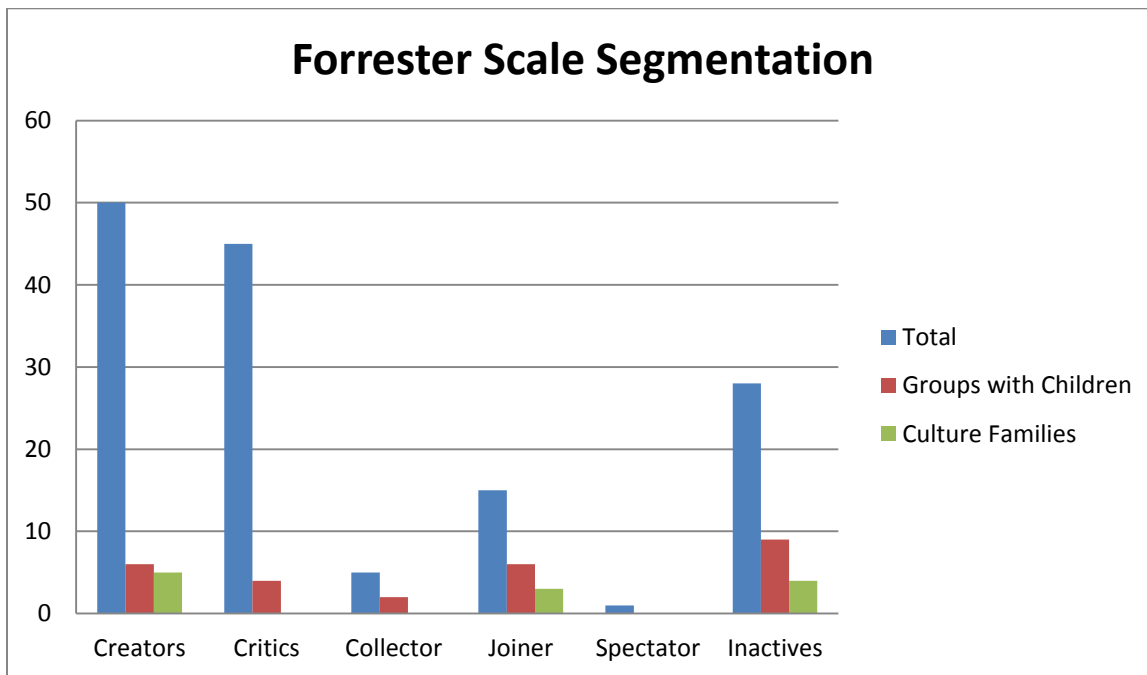


Figure 20 Segmentation Using the Forrester Scale

By giving visitors the explanations of the different visitor segments in a multiple choice question we were able to classify them into the different categories. The most common visitor to the Tower is Tick the Box, followed by Time Travellers, Icon Seekers, and Culture Families shown in Figure 21. These categories cover the greatest number of visitors. This can be very helpful in making our final recommendation for a Mint Street mobile application.

Segmentation Using the Historic Royal Palaces Model

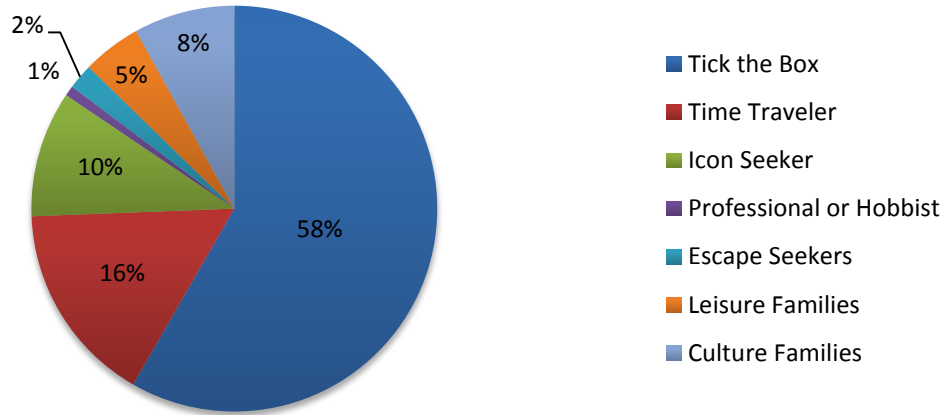


Figure 21 Segmentation Using the Historic Royal Palaces Model

Finally, visitors stated if they visited the Historic Royal Palace website before and if they plan to visit it after their visit. This data is shown in Figure 22. Though 27% stated that they would never bother to visit the Historic Royal Palaces website about 35% said they plan to visit the website following their experience at the Tower. This can be used to correlate the use of a mobile application outside of the Mint Street exhibition as a method of revisiting the exhibit.

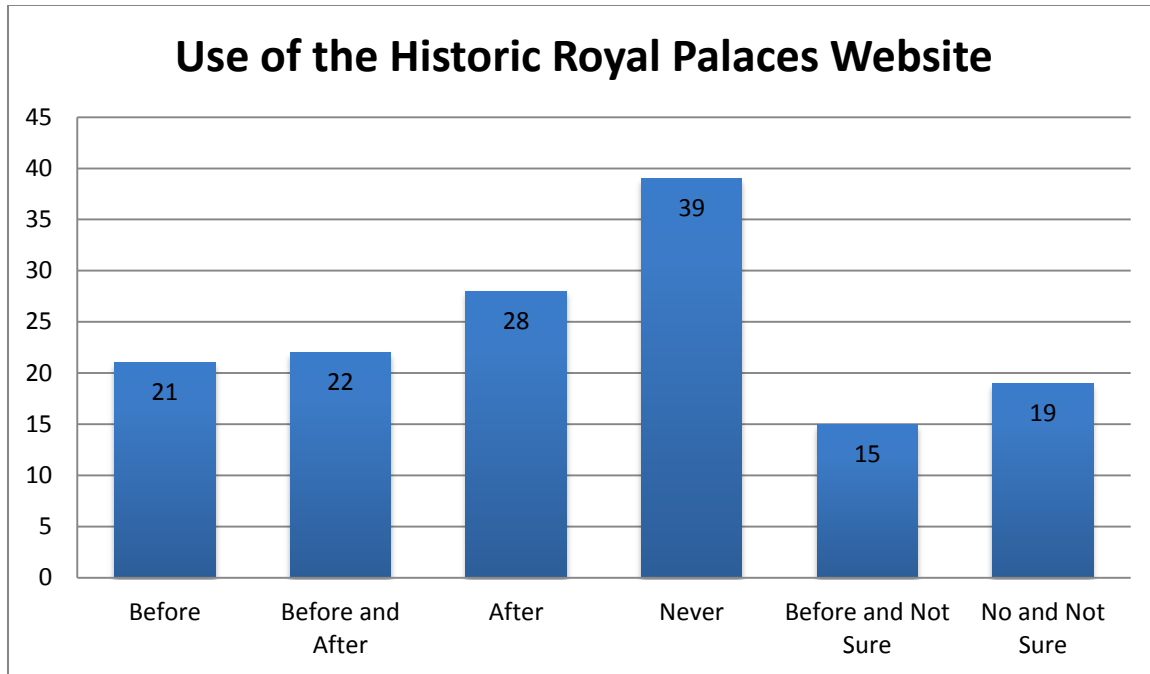


Figure 22 Use of the Historic Royal Palaces Website

4.3 In-depth Qualitative Survey

The In-depth Qualitative Survey collected 19 responses during school vacation week. The focus of the In-depth Survey was obtaining the visitor's perspective on the possibility of a mobile application at the Tower of London. Our data showed that 73% of people believed that a mobile application could enhance their experience at the Tower. Figure 23 shows that 79% of people believe they would use a Tower application. More than half of respondents stated they would use a mobile application in an exhibit at the Tower of London. This data strengthened the argument for the plausibility of a mobile application at Mint Street.

Visitors Who Want to Use the Mobile Application

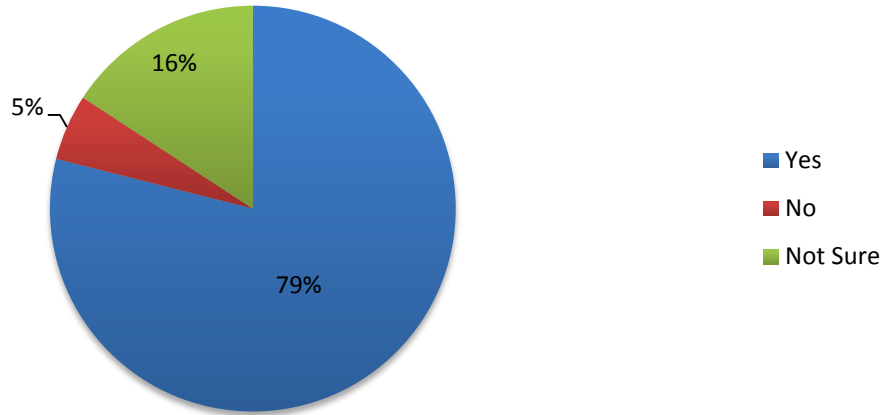


Figure 23 Visitors Who Want to Use the Mobile Application

Visitors gave their opinion on different possible types of mobile applications for an exhibit in the Tower of London. The most popular responses were games and augmented reality, as shown in Figure 24. These findings were directly applied to our recommendations for the Mint Street Exhibit to help the project team decide how to incorporate a mobile application.

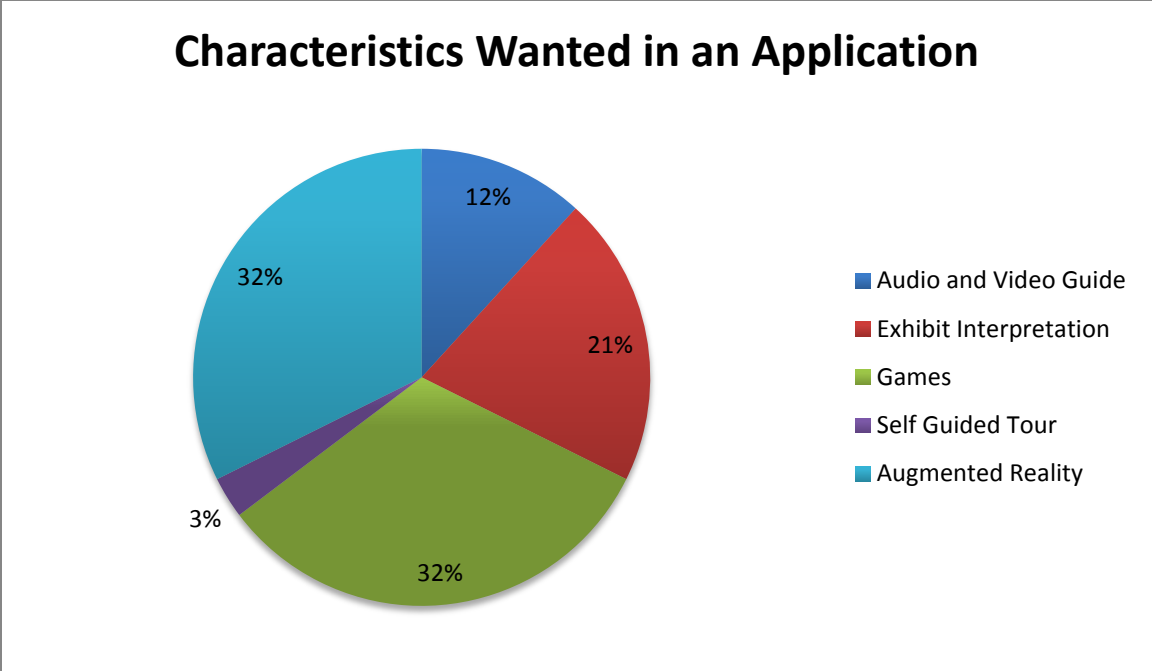


Figure 24 Characteristics Wanted in an Application

4.4 Cross Correlations

To reach more sophisticated conclusions we have used data from the Museum Evaluation Matrix, the Short Quantitative Visitor Survey, and the In-depth Qualitative Visitor Survey. Through doing this we have found that mobile applications bring added value to exhibitions, as well as, what needs to be done to successfully implement a mobile application. The values that can be added to the Mint Street Exhibition with a mobile application are: allowing visitors to learn at their own pace, helping engage the whole family, sharing the visitor’s experience, and extension of the visitor experience.

4.4.1 Learning at Their Own Pace

Visitors value being able to learn about what interests them most and doing so at their own pace. As seen in Table 2, Section 4.1.7, of the data collected by the Museum Evaluation Matrix the five most appealing digital media that we evaluated are News Science Museum, Kings Cross, Londinium, Problems, and Darwin. The matrices from these sites in Appendix J show that each media allowed visitors to browse through material of their choice at their leisure.

In addition from our long survey a visitor stated, “I really like the idea of using my own phone and going at my own pace.”

4.4.2 Engaging the Whole Family

In order for a mobile application on Mint Street to be successful it must engage the whole family. Due to the exhibition’s focus on families it is important to engage the whole group, not just the person controlling the hand-held device. As shown in Figure 25 families make up a significant number of the groups with three or more people, roughly 39%, validating the Mint Street Project’s interest in these groups.

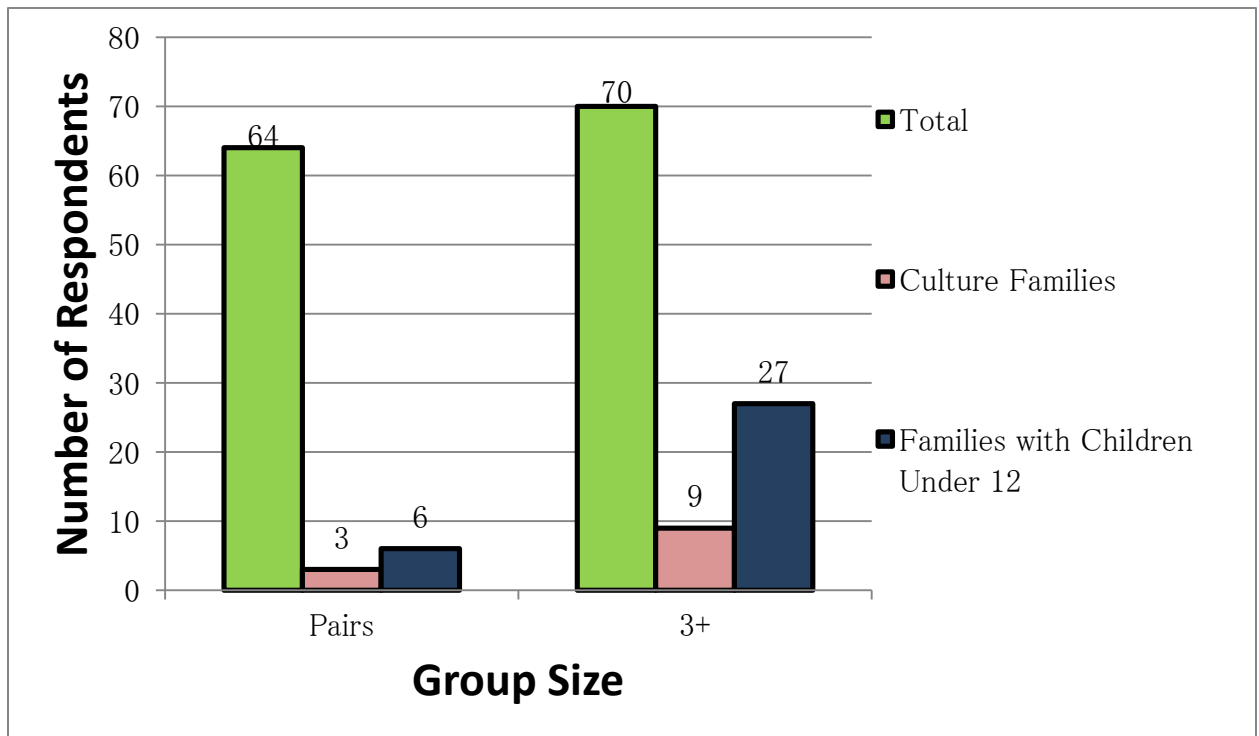


Figure 25 Number of Respondents in Groups Two or More

4.4.3 Sharing an Experience

Sharing an experience with friends or family is another value that can be added by a mobile application. Through the use of our Short Quantitative Visitor Survey we were able to assess visitor technology use, as well as, online presence. This gave us the information necessary

to classify visitors on the Forrester Technographics Scale. As shown in Figure 26, the majority of visitors fall under the Creator and Critic categories on the Forrester Scale.

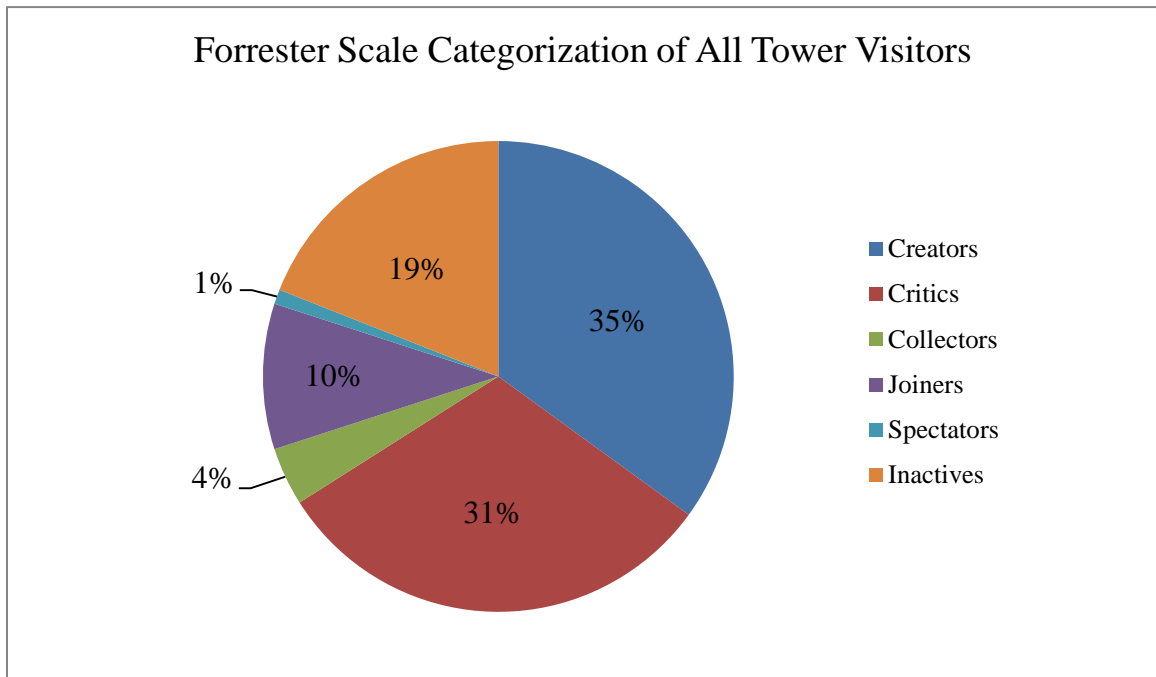


Figure 26 Forrester Scale Categorization of All Tower Visitors

Through looking at this chart we are able to conclude that visitors to the Tower are technologically savvy, active online, and enjoy interacting with others. Observing the definitions of Creators and Critics, those who are the most active online and in social media, we are able to infer what types of online interactions they most enjoy. The features these two groups would most enjoy are uploading and commenting features.

4.4.4 Extension of the Experience

Extending the visitor experience is an important value that can be added to the Mint Street Exhibition by a mobile application. In our Short Quantitative Visitor Survey we asked visitors about their previous and possible future interactions with the Historic Royal Palaces website. Visitors were segmented depending on their use of the Historic Royal Palaces website, before and after their visit to the Tower of London. As seen in Figure 27, roughly 40% of visitors visit the website beforehand and 35% of visitors said that they plan on visiting the website after they conclude their visit to the Tower. When prompted further many visitors stated that their

reason for visiting the website after was to learn more about the Tower and what they learned on their visit, which a mobile application could build upon.

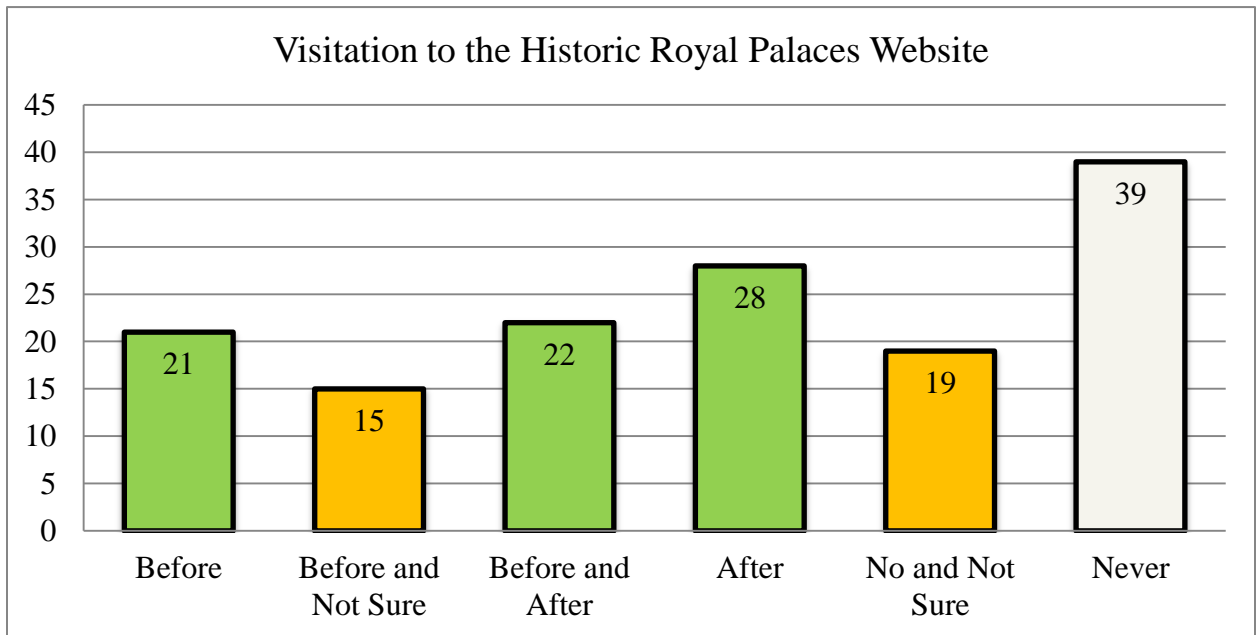


Figure 27 Visitation to the Historic Royal Palaces Website

4.4.5 Promotion and Technology to Support a Mobile Application

A mobile application at the Tower requires a Wi-Fi hotspot near the exhibit so visitors can download the application. From our visitor survey we have seen that of the visitors who would like to download a mobile application at the Tower, 75% would prefer to use Tower-provided Wi-Fi. Of the visitors to the Tower, 77% are from foreign countries and are less likely to have access to low-cost mobile networks in London. In order to meet the needs of the majority of the visitors a mobile application at the Tower would require a Wi-Fi hotspot.

In order for a mobile application at the Tower to be successful, it needs to be promoted. While conducting the evaluations reported in the Museum Evaluation Matrix, our group found very little promotion for the digital media and mobile applications that were available in those museums. After being told about digital media and applications at various museums by our sponsors, our group sought more information about the mobile applications, yet still had difficulty doing so. In order to make the mobile experience less stressful and less work for the visitors, eye-catching and informative notices should be used. Of the visitors that we surveyed,

only 17% of visitors with smartphones said that they had used a mobile application at a museum or heritage site before. Visitors may not be aware of the existence of mobile applications at museums and heritage sites. Advertising could help fill this gap.

A mobile application needs to be developed for both iOS and Android. Of the visitors we surveyed that owned smart phones 64% owned iPhones/iPads and 22% said they owned Android devices. In order to cover the majority of visitors with smart phones a Tower mobile application needs to be developed for both iOS and Android platforms.

5. Conclusions & Recommendations

5.1 Constraints on the Exhibition

The unique qualities of the Mint Street Exhibition have already presented several limitations for the project team. One constraint is the confined space of the exhibition, only accommodating 50 or so visitors at a time. Similarly, visitors are only expected to be in the exhibition for a short time; the expected dwell time is ten minutes. A mobile application can neither diminish the flow of visitors nor take focus away from the exhibition itself. Instead, a mobile application should add value to the experience of the Mint Street Exhibition. Another challenge the exhibition faces is a possible lack of awareness among visitors. The majority of Tower visitors are from overseas, and many of them may not know about the Royal Mint. Additionally, Mint Street will be competing with the Crown Jewels and better-known Tower attractions.

5.2 Mobile Apps Add Value

Our research indicated four distinct areas in which a mobile application can add value to a visitor's experience. We observed that mobile applications give visitors the ability to learn at their own pace, by providing the option of when and where to learn. The Mint Street Exhibition is seeking to appeal to families, specifically, Culture Families. When correctly implemented, a mobile application enhances the visit for the whole family, facilitating group engagement and learning. With a mobile application, visitors will be able to share their experience within their group, with friends and family, as well as, with other visitors. Because space and time are limited, extending the visitor experience beyond the confines of the exhibit is a valuable addition.

5.2.1 Learning at Their Own Pace

Our initial research suggested that allowing visitors to learn at their own pace was a key quality that a mobile application should provide. From research we found that many experts, such as Hawkey and Ally, say the learners gain more control over what, where, and when they

learn based on the availability of mobile devices (Ally, 2009). Making visitors active learners allows them to absorb information through social means, such as conversations, communication, and control over their experience (Hawkey, 2004). Our interviews, museum evaluations, and surveys support this finding. A New Media Developer from the Science Museum stated, “An advantage to an app is that visitors can be in control of their visit.” This freedom of learning was further confirmed with visitor surveys, with many visitors indicating that using their own phone would allow them to move about and learn at their own pace. We substantiated this conclusion through our museum evaluations, finding that the most widely appealing digital media included some form of visitor freedom, giving them choices. One way to enhance self-paced learning is to implement Wi-Fi at the Tower. Wi-Fi would give visitors access to more information, as well as, allow them to access the information whenever they want, giving them the freedom and choices they seek.

5.2.2 Engaging the Whole Family

The Mint Street Exhibition aims to appeal to families. A mobile application should thus provide a family atmosphere. From the surveys, we were able to conclude that most Tower of London visitors come in groups of at least two, with the majority of parties being comprised of three or more. Knowing that families are mostly in larger groups, a fundamental recommendation for an application is to make it group accessible. All members of these groups need to be able to participate in the use of the mobile application regardless of group size.

We also concluded that Culture Families would prefer a mobile application to be a game or incorporate augmented reality. Thus, our recommendation is to create a mobile application that combines both aspects. To further back our recommendation, we looked at research done by MHM, which concludes that almost all visitors (93%) showed interest in seeing what Mint Street looked like in the past (Morris Hargreaves McIntyre, 2010). As augmented reality supports this type of experience, including it within a game would allow for much wider appeal amongst families. With this said, if the survey was to be administered again, it would be important to gauge how groups would want to interact with a mobile application. Some examples of questions to ask would be:

- How many smart phones are there among your party?
- Would you feel comfortable using an app as a group on one device?

These questions would help clarify how a group would interact when using a mobile application.

5.2.3 Sharing an Experience

Classifying visitors on the Forrester Scale gave us important information on the types of interactions people enjoy within social media, particularly with the ability to share their own experience. From these findings, visitors, including families, have the knowledge and drive to use social media. Hence, visitors would most enjoy the uploading and commenting features within a mobile application, as these features would appeal to a majority of Tower visitors. General recommendations are to include an uploading and commenting feature. Examples of uploading are photos, videos, or a visitor's personal story, while examples of commenting are viewing and discussing other's photos or stories, or voicing ones opinion on the exhibition.

5.2.4 Extending the Visitor Experience

The Mint Street Exhibitions limitations of space and dwell time reinforce the importance of extending the visitor experience. The lack of space and period of time visitors are expected to spend in the exhibition indicate that extending the visitor experience on Mint Street might be a goal of the application. Evidence from our visitor surveys showed that a good portion of visitors plan to visit the Historic Royal Palaces' Tower of London website following their visit. Several parents stated that they would like to visit the website after for the benefit of the children's learning and experience at the Tower. We can conclude that visitors are already seeking to extend their visit and recommend that be a major focus of a Mint Street mobile application.

5.3 Summary of Conclusions & Recommendations

Through our analysis we concluded that a mobile application is indeed worth creating for the Mint Street Exhibition. Not only will it give visitors a new, digital way to experience the exhibition, but it also meets their changing needs. We know a majority of visitors to the Tower of London have a smart phone or tablet, are familiar with mobile applications, and many of them

have a strong online presence. Historic Royal Palaces has a chance to reach a wider visitor base by implementing a creative application. Our conclusions show that a mobile application may have the best chance for success by being a game with augmented reality that incorporates social activities, such as uploading personal experiences. Keeping the lack of space in mind, as well as, not taking away from the actual exhibit, the mobile application should be able to be used both before and after walking through the Mint Street Exhibition.

Through our analysis it was clear that we could make other Tower-wide recommendations. If a mobile application is introduced, it must be adequately promoted. This can be both on-site and online, as we see that a large amount of visitors do visit the website prior to coming. Additionally, there must be Tower provided Wi-Fi where visitors can download a mobile application, if not use it throughout their visit. Many visitors are not from the England, and thus might be limited in how they can download a mobile application.

From our results, there are a few issues we wish we addressed. It is important to find out visitors opinions of group interaction. It would be beneficial to know if visitors want the entire group to get involved and how feasible this would be, given the screen size on some devices. Although we found that a mobile application is appealing to visitors of the Tower of London, we failed to ask if they would prefer to use a mobile application for one specific exhibit or throughout the Tower as a whole. We were also unable to determine if visitors would be willing to pay for a mobile application at the Tower because of the difficulty in phrasing a question that would give us sound results. Our recommendations are also geared for the creation of a free application on Mint Street. Ideally, we would have had more time for our In-depth Qualitative Visitor Survey to get more responses and specific information on visitor experiences, as well as, learn how a mobile application could improve their visit. If Historic Royal Palaces wishes to continue this research we recommend that they explore group interactions and get more responses on the In-depth Qualitative Visitor Survey, specifying that the application is meant for an exhibition rather than throughout the Tower.

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Appendix A: Sponsor Description

Sponsor Description

In 1989 Historic Royal Palaces (HRP) was created under the Department of the Environment to run the five palaces: Tower of London, Hampton Court Palace, Banqueting House, Kensington Palace, and Kew Palace. In 1995, HRP was transferred from the Department of Environment to the Department for Culture, Media & Sport (previously known as the Department of National Heritage). Eventually, in the spring of 1998 HRP was released from direct government control and became an independent charity that runs and operates the palaces completely separately from the monarchy and the government. (History: A brief history of the Historic Royal Palaces) Today HRP runs solely on the income that it makes from admissions, concessions, retail sales and the generous donations made by its patrons. (Who we are)

HRP's mission is "to help everyone explore the story of how monarchs and people have shaped society, in some of the greatest palaces ever built (Who we are)." HRP has four main principles that govern the way the charity works: guardianship, discovery, showmanship, and independence. The trustees have five strategic aims to implement for the future of the palaces. The HRP strives to give the palaces the care they deserve, transform the way visitors explore their story, have a wider impact on the world, build one organization united behind their mission, and to generate the money necessary to make it all possible. (What we do?)

The organizations objectives are "to manage, conserve, renovate, repair, maintain and improve the Palaces to a high standard consistent with their status as buildings of royal, historic and architectural importance (Financial Statements, 2011)." The HRP strives to educate the world by providing public access to these historic palaces by exhibition, events and education programs (Who we are).

In the Tower of London there are many exhibits and activities that will take you around the Tower where you can learn all about the people that have been in the Tower, from the monarchs, to the prisoners, to the animals that were held captive. Visitors can start by watching the opening ceremonies followed by a tour from the Yeoman Warders or beefeaters. In the Jewel House you can see the Crown Jewels and the royal crowns can be seen in the Martain Tower. Jewels are found on more than just the crowns, in the "Fit for a King" exhibit you can see 500

years of royal armour, including diamond encrusted revolvers. Visitors can learn about the stories of the Ravens in the Tower, as well as, the other animals who were held captive, in the current “Royal Beasts” exhibit. With the Tower’s current digital media application you can move through the Tower, learning more about the prisoners of the Tower. More hands on activity can be found in exhibits such as “Hand-on-History,” as well as, “Fortress!” where people have the opportunities to handle crossbows. But none of this could be accomplished without the executive staff (Five palaces, infinite possibilities).

The five palaces that are operated and maintained by HRP had a total income of £62 million in 2010/11, shown in Figure 7. The majority of this income, 63%, came from admissions, although retail sales, 15.6%, and fees for functions and events, 7.4%, also contributed substantially. In terms of expenditures, Figure 7 shows that public access (i.e., access to the exhibits, buildings, and grounds), interpretation and learning (i.e., programs and activities), and outreach programs (“wider impact in the world”) consumed approximately 52% of the budget, while maintenance of the buildings and grounds (i.e., “give the palaces the care they deserve”) consumed 28% of available funds. (Annual Review 2010/2011)

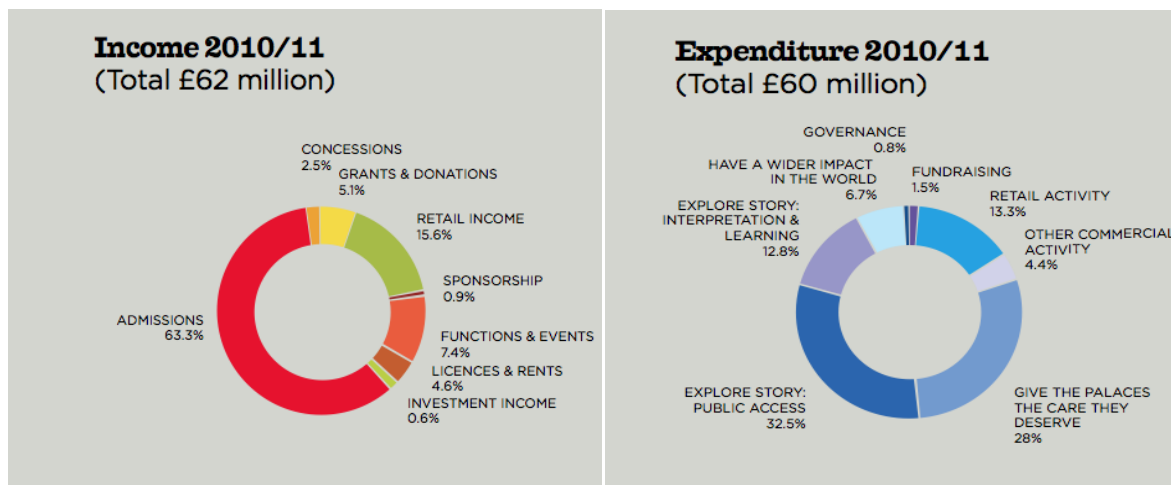


Figure 28 Income and Expenditures

As noted above, most of the income was generated through admissions costs to the respective palaces. Although specific financial information for the Tower was not made available, it can be assumed that the patter of income and expenditures across the five palaces is similar. Analyzing visitor trends between the five palaces can reveal the breakdown of income generated through admissions costs. The HRP has reported a constant rise in number of visitors,

with 2.9 million in 2006/7 rising to 3.2 million in 2010/11, show in Table 1. Looking more closely at the 2010/11 numbers, the Tower of London had the most visitors with 2.4 million. This means visitation at the Tower makes up 75% of total visitation and thus contributes 75% of the income from admissions (Annual Review 2010/2011).

Table 3 Visitor Trends (Financial Statements, 2011)

Visitor trends					
	2006/07 (000's)	2007/08 (000's)	2008/09 (000's)	2009/10 (000's)	2010/11 (000's)
Tower of London	2,099	2,128	2,130	2,403	2,409
Hampton Court Palace	476	499	473	624	554
Kensington Palace	251	273	243	259	245
Banqueting House	18	17	24	23	27
Kew Palace	79	58	31	29	30
Total	2,923	2,975	2,901	3,338	3,265

Even with substantial income coming from admissions and concessions, HRP and the Tower of London would not be what it is without its volunteers and donations. Due to generous donations the Tower has undergone great improvements. With the help of Sir Paul Getty, the Heritage Lottery Fund, as well as, the Pool of London Partnership they were able to update the area surrounding the Tower. They are looking to find funding to restore the White Tower, as well as, a new place for the Crown Jewels for this year. Similarly, the Tower has numerous volunteers and employees, as seen in Table 2. It shows that the total number of employees at all five palaces increased from 707 to 709 between 2010 and 2011. It also shows that a majority of the staff works in maintenance of the buildings and grounds and public access, showing the emphasis on making the palaces welcome places for the public, while preserving the thousand years of history (Financial Statements, 2011).

Historic Royal Palaces is here to make sure that the history, even the most treacherous parts, at the Tower is preserved. HRP's goal to educate the public on the palaces of England is fulfilled by their ever changing exhibitions from hands on to hand media. The educational techniques may change, however HRP is working hard to make sure that the palaces survive for centuries to come.

Table 4 Employees and Volunteers at the HRP Palaces (Historic Royal Palaces, 2011)

	2011 FTE	2010 FTE
Fundraising	8	7
Retail activities	83	89
Other commercial activities	21	21
<i>Give the palaces the care they deserve</i>	133	136
<i>Transform the way visitors explore their story:</i>		
Public access	294	292
Interpretation and learning	87	84
<i>Have a wider impact in the world</i>	19	18
Governance	4	4
Support costs	60	56
Total	709	707

Appendix B: Basic Timeline

Pre London	Week One	Week Two	Week Three	Week Four	Week Five	Week Six	Week Seven
1							
2							
3							
4							
5							
6							
7							
1	2	3	4	5	6	7	
Create Museum Evaluation Matrix	Develop and pretest surveys and interview prompts	Conduct Staff Research	Evaluate Museums	Short Survey	Long Survey	Compiling, Analyzing, and Writing	

Appendix C: Interview Preamble

Interview Preamble:

We are conducting a project to research and evaluate visitors' attitudes to, and uses of, digital media using their own hand-held devices at the Tower of London, with a particular focus on the Tower Mint. This research will enable us to understand our visitors and to develop new digital media, in interpretation, education, and other projects, at the Tower of London.

As an interviewee you have certain rights during the interview:

1. Right to end the interview at any time you choose.
2. Right to skip any specific questions.
3. Right to confidentiality.

To begin the interview we need your informed consent. You have the right to revoke that consent at any time. At the end of the interview we will ask you to sign a waiver giving us your consent to use your name in our final report. You are by no means obligated to sign this waiver. However, if you chose to our waiver you maintain the right to review our final report before submission as well as revoke your consent at any given time.

Appendix D: Historic Royal Palaces Staff Interviews

Appendix D1: Interview with Wayne Halstead

Interview with: Wayne Halstead, Marketing Manager, HRP

Questions tailored to Wayne Halstead:

1. As a marketing manager, how do you envision hand-held digital media being used within the setting of the Tower of London?
2. Do you think that the implementation of hand-held digital media could help make your job, both as a marketing manager and a Historic Royal Palaces employee, any easier? Why or why not?
3. As a marketing manager, are there any specific features you would like to see in a mobile application?
4. What are the protocols Historic Royal Palaces has in place for visitor surveys?
5. What Historic Royal Palaces surveys have you had a hand in developing, conducting or analyzing?
 - What was the nature of those surveys?
 - How were those surveys conducted?
6. How did you and your team handle randomizing the survey participants?
7. How did you and your team handle refusals to participate in the survey and language barriers?
 - How did you record these happenings?
8. What did you and your team do/use to code and analyze the results of the survey?
9. Are there any recommendations you have for conducting a survey?
10. Have you come across any number or types of questions that visitors seem to like best?
11. In your experience, where are the best places and times to interview people at the Tower of London?

Appendix D2: Interview with Ina Pruegel

Interview with: Ina Pruegel, Digital Learning Resources Officer, HRP

Questions tailored to Ina Pruegel:

1. Why does Historic Royal Palaces want to explore the implementation of hand-held digital media in the Tower of London?
2. What information is Historic Royal Palaces hoping to obtain through our research project?
3. As a digital learning resources officer, how do you envision hand-held digital media being used within the setting of the Tower of London?
4. Do you think that the implementation of hand-held digital media could help make your job, both as a digital learning resources officer and a Historic Royal Palaces employee, any easier? Why or why not?
5. As a digital learning resources officer, are there any specific features you would like to see in a mobile application?
6. What other digital media endeavors has Historic Royal Palaces undertaken in the past?
 - Were those endeavors successful? Why or why not?
7. What are problems that you've encountered in developing or implementing digital media in the palaces?
 - How were those problems handled?
8. In your experiences, what types of digital media content do visitors like best?
9. Are there any ways of providing hand-held digital media you suggest looking into? (i.e. QR codes, NFC chips, GPS location based information, etc.)

Appendix D3: Interview with Nigel Randall

Interview with: Information Systems Staff, HRP

Questions tailored to IS Staff Members:

1. As an IS staff member, how do you envision hand-held digital media being used within the setting of the Tower of London?
2. Do you think that the implementation of hand-held digital media could help make your job, both as a IS staff member and a Historic Royal Palaces employee, any easier? Why or why not?
3. As an IS staff member, are there any specific features you would like to see in a mobile application?
4. What other digital media endeavors has Historic Royal Palaces undertaken in the past?
5. What are problems that you've encountered in implementing digital media in the palaces?
 - How were those problems handled?
6. In your experiences, what types of digital media content is the easiest to integrate?
7. Are there any ways of providing hand-held digital media you suggest looking into? (i.e. QR codes, NFC chips, GPS location based information, etc.)
8. What upgrades would the Tower of London network/system need in order to handle the addition of a mobile application?
9. What would you estimate the cost of implementing and maintaining a mobile application in the Tower of London would cost? Specifics?

Appendix E: Interview Questions for Museum Professionals

1. How is digital technology currently being used in the museum?
 - a. Do you have any mobile applications?
2. What does technology help the museum accomplish?
3. What are some of the key advantages and disadvantages of digital media that you have found in previous endeavors?
4. What would you like to accomplish in the future with technology?
 - a. More integration into exhibits?
 - b. Focal point of exhibit or way of getting a better experience?

Appendix F: Interview Notes with Historic Royal Palaces Staff

Appendix F.1 Nigel Randal 20 March 2012

Digital Media in the Tower

Minutes for 20 March 2012

11:00 AM

Nigel Randall (head of IS)

Attendees: Megan Gooch, Dominique Driver, Michael Bartlett, Bryan Myers, Todd Pfizenmaier, Lauren Waring, Ina Pruegel, Ilea Graedel, Andy Fenny, Julie Cullen, Katie Whittier

- Look at the Tate
 - Talk to Emily
 - New Website, lots of apps (9)
 - Similar challenge to HRP
- Try and get completely random population
 - No children or school groups
 - Different locations and times of day
 - Use to make recommendations
- Focus at tower to get more numbers
 - Small scale, if results are good then can use at other sites
- Use information to determine membership
 - Log-in
 - People may not want membership
- Gaps
 - Battery-life-> phone charging ports
 - Wi-Fi
 - Group working on it
 - Gauging in survey administering
 - Awareness of application-helps
 - Buying tickets online
 - How many??
- Gearing projects to Mint Street
- Read stats in newspapers
 - Have smart phones
 - Whether turning it off
- Furpoke app
 - Virtual reality
- Museum of London application
 - Street museum
- QR Codes

- Think they are the first step to reaching visitors
 - Maybe surpassed by RFID or NFC in the future Museum of London
- Value added content
- British Museums putting QR Codes in Money exhibit
- Active rather than passive
- Observer
- “scan this if you liked this”
- Quest-treasure hunt
- QR needs Wi-Fi
- Exhibition Application
 - The more “super app” you make it the less specific it becomes
 - Creating a “standard visitor app”
- How to use the data about the use of the application ***
- Would you charge for an app
 - Dom: no
- V&A had paid for application for certain exhibit
- Do you pay for application?
 - Parents may pay to help educate child
- Unpaid v paid
 - Meg: people may pay more attention to detail if they pay for it
 - Dom: you will get enough people, are you reaching everyone
- Interview possibly next Thursday

Appendix F: Interview Notes with Historic Royal Palaces Staff

Appendix F.1 Ina Pruegel 21 March 2012

Digital Media in the Tower

Interview Ina Pruegel

Michael Bartlett

Minutes for 21 March 2012

1:00 PM

Attendees: Bryan Myers, Todd Pfizenmaier, Lauren Waring

1. Why does Historic Royal Palaces want to explore the implementation of hand-held digital media in the Tower of London?
 - a. Because people have them as tools, people are using them in different ways
 - b. People expect it, interweaving in everyday life
2. As a digital learning resources officer, how do you envision hand-held digital media being used within the setting of the Tower of London?
 - a. Not for commercial gain
 - b. Needs to be balance
 - c. Information, when, where, events, future
 - d. Making stories allow people to immerse self instead of reading displays
 - e. Learn more information
 - f. Better engagement
3. As a digital learning resource officer, are there any specific features you would like to see in a mobile application?
 - a. Share and personalize
 - i. I.e. send family a picture
 - b. Communication platform
 - c. Exchange content
 - d. When you come home you can have a different experience
4. What other digital endeavors has Historic Royal Palaces undertaken in the past? Where that endeavors successful? Why or why not?
 - a. PDA's, never used, couldn't play flash files
 - b. No Wi-Fi or 3G
 - c. No video conferences
 - d. Not much
 - e. Looking to use smart phones and apps
 - f. Problems with organization
 - i. Staff don't know what am app is
 - ii. Infrastructure
 - iii. Technology
 - g. Scrapped PDA project
5. In your experiences, what types of digital media content do visitors like best?

- a. learning or tech wise?
 - b. If using phone now. Looking at practicalities
 - c. People engage after, maybe not on-site***maybe should include would you rather use the app on site or off
 - d. Quests work well
 - e. Transmedia storyline entices them
 - f. Come and feel happy about what they have done
 - g. Website not great so it is hard to get information
6. Are there any ways of providing hand-held digital media you suggests looking into? (i.e. QR codes, NFC chips, GPS location based information, etc.)
- a. off site app for Kensington
 - b. QR codes but need 3G connection
 - c. More and more people with iPads interested in having app
 - d. How can technology aid in education?
 - e. Engages them, facilitates to pay attention. iPad lets them be involved in process, engages them, questions the iPad asks is where the education comes from
 - f. Opportunity to find more information and engaged with the place.

Appendix F.2 Nigel Randall 20 March 2012

Digital Media in the Tower

Minutes for 20 March 2012

11:00 AM

Nigel Randall (head of IS)

Attendees: Megan Gooch, Dominique Driver, Michael Bartlett, Bryan Myers, Todd Pfizenmaier, Lauren Waring, Ina Pruegel, Ilea Graedel, Andy Fenny, Julie Cullen, Katie Whittier

- Look at the Tate
 - Talk to Emily
- New Website, lots of apps (9)
- Similar challenge to HRP
- Try and get completely random population
 - No children or school groups
 - Different locations and times of day
 - Use to make recommendations
 - Focus at tower to get more numbers
 - Small scale, if results are good then can use at other sites
- Use information to determine membership
 - Log-in
 - People may not want membership
 - Gaps
 - Battery-life-> phone charging ports
- Wi-Fi
 - Group working on it
- Gauging in survey administering
- Awareness of application-helps
 - Buying tickets online
 - How many??
- Gearing projects to Mint Street
- Read stats in newspapers
 - Have smart phones
 - Whether turning it off
- Thorpe Park app
 - Virtual reality
- Museum of London application
 - Street museum
 - QR Codes
 - Think they are a fad
- Museum of London
 - Value added content
- British Museums putting QR Codes in Money exhibit
 - Active rather than passive
 - Observer
 - “scan this if you liked this”

- Quest-treasure hunt
- QR needs Wi-Fi
- Exhibition Application
 - The more “super app” you make it the less specific it becomes
 - Creating a “standard visitor app”
 - How to use the data about the use of the application ***
 - Would you charge for an app
 - Dom: no
- V&A had paid for application for certain exhibit
 - Do you pay for application?
 - Parents may pay to help educate child
 - Unpaid v paid
 - Meg: people may pay more attention to detail if they pay for it
 - Dom: you will get enough people, are you reaching everyone
- Interview possibly next Thursday

Appendix F.3 Wayne Halsted and Michaela Rogers 23 March 2012

Digital Media in the Tower

Interview Wayne Halsted, Michaela Rogers

Todd Pfizenmaier

Minutes for 23 March 2012

10:00 AM

Attendees: Bryan Myers, Mike Bartlett, Lauren Waring

- What do you like and/or dislike about the idea of hand-held digital media use in the tower?
- W-don't dislike any, HRP concern may be that it will lose it's atmosphere
- Way finding, visitor interpreter, experience, share
- M-nothing to dislike
- Cost effective, and what people expect
- Up to the visitors if they want to use there phone
- W- gap between what they get and what they want, an app would give them the choice
- How do you feel about current/previous use of hand-held digital media within the tower?
- W- completely lacking, behind times (10 years)
- people are expecting more
- competing with the London eye
- step back in time...too much
- M-historic hotspots that could be enhanced, see what it was like at the time
- Scores of each part of the tower.
- What are the protocols Historic Royal Palaces has in place for visitor surveys?
- W- organize and run by specialist
- BDRC- they take the pain away
- How did you and your team do/use to code and analyze the results of the survey?
- Send it, it was taken from BDRC
- Steve or Amy
- Sampling system
- Significant sample ~400
- Residence counts
- Code and analyze results for the tower
- Questionnaire Comments
- #9 family options
- #10 get rid of the opt out section
- When you buy the app factors in
- You don't know the reason for the no
- People don't know what an app is.

Appendix F.4 Wayne Nigel Randall 29 March 2012

- Digital Media in the Tower
 - Interview with Nigel Randall
 - *Todd Pfizenmaier*
 - Attendees: Bryan Myers, Mike Bartlett, Lauren Waring
- Minutes for 29 March 2012
10:00 AM
- How do you See Media at the Tower
 - Consumer acquisition and awareness
 - During visit to enhance journey
 - After, dealing with their memories
 - Customers who will come back again and keep them engaged
 - Features
 - Depends on purpose
 - General (apply to every visitors)
 - Around queue lengths, where to eat, map, general events, and overs, on off premises
 - Did you know
 - Location based
 - Upgrades
 - Wi-Fi
 - Wi-Fi in historic building; wall and cabling (over lighting)
 - Know the customers
 - Few hundred thousand
 - Wi-Fi could be used for many things
 - Customer benefit
 - Marketing- getting people's emails.
 - 50%
 - Technology wasn't advanced enough at the time
 - Over arching strategy to explore new technology
 - Ways QR Codes, NFC chips
 - Need to prepare ways of getting extra information
 - QR codes can be non black and white
 - Even if QR goes away then still good and prepared for future infrastructure still embedded in the web
 - Not seeing advertisements
 - Advertising
 - Challenge, guidebook, QR code in front of guidebook
 - Public landing page when joining Wi-Fi
 - Who looks at the web compared to who has smart phones
 - Are people looking at the web before they get to the tower
 - Thorpe Park App
 - Fan fair

- Good for engagement
- Augmented reality
- Questionnaires
- What does the customer want?

Appendix G: Interview Notes with Museum Professionals

Appendix G.1 Natural History Museum 15 March 2012

Digital Media in the Tower

Minutes for 15 March 2012

Interview with Natural History Museum Staff

1:00 PM

Michael Bartlett

Attendees: Bryan Myers, Todd Pfizenmaier, Lauren Waring

Digital Media in Galleries

Online and at museums

Exploring mobile areas as of now

Developed main website for use for mobile phone

Specific content

App to identify insects

Explosion of mobile devices because of easy accessibility

Have to keep in mind connectivity

No Wi-Fi

Just about to do surveys about website

Looking at re-doing marketing segments

Appendix G.2 Science Museum 5 April 2012

Digital Media in the Tower

Interview with New Media Developer from the Science Museum

Todd Pfizenmaier

Attendees: Lauren Waring

Minutes for 5 April 2012

10:00 AM

- What does technology help the museum accomplish?
 - Interpretation
 - Used to explain concepts
- What are some of the key advantages and disadvantages with digital media that you have found in you previous endeavors?
 - Advantages
 - Be in control of their visits
 - Different levels of interpretation
 - Story-telling or journey
 - Disadvantages
 - Less sense of exhibit
 - Expensive
 - Lack of confidence to use, don't want to look stupid

Appendix H: Museum Evaluation Matrix

Museum Name	Response	Comments						
Promotion of application								
Were there signs for the application?								
How many?								
Were they informative? What type of information was delivered?								
Did they grab your attention?								
Was it advertised outside the museum?								
			<i>Creators</i>	<i>Critics</i>	<i>Collectors</i>	<i>Joiners</i>	<i>Spectators</i>	<i>Inactives</i>
Enhancement of Visitor Experience			24	25	27	23	28	20
Did you interact with anyone else while using the application?			1	2	3	4	6	5
Did the application require you move around the museum?			1	2	3	4	6	5
Did you spend a long time on the application?			1	2	3	4	5	6
Can you use the app before or after the visit?			6	5	4	3	2	1
Are things "postable"? (high scores, tricks and tips)			5	6	4	3	2	1
Can you upload contents?			6	5	4	3	2	1
Does the application give you updates or notifications as you use it?			4	3	6	2	5	1
Does the application respond differently depending on how someone uses it?			2	3	5	4	6	1
Ease of Use								
Are there paper directions?								
Are there directions on the application?								
Is there someone to help explain the application?								
How easy is it to navigate through application?								
Integration and Implementation								
Is the application run through a third party application? (For example SCVNGR)								
Are museum workers aware of the application?								
What types of technology is the museum using?								
Does the application cover exhibits in the whole museum?								
Attributes								
Did you play as a character?								
Did you play as yourself?								
Was it a game?								
Was it informational?								
Was there too much to read?								

Appendix J: Museum Evaluation Matrix Results

Appendix J1: Science Museum Game

Museum Name	Response	Comments								
Science Museum Game										
Promotion of application										
Were there signs for the application?		part of exhibit								
How many?		part of exhibit								
Were they informative? What type of information was delivered?	no	can't quickly or easily tell								
Did they grab your attention?	yes	bold color								
Was it advertised outside the museum?		part of exhibit								
Enhancement of Visitor Experience			Creators	Critics	Collectors	Joiners	Spectator	Inactives		
			24	25	27	23	28	20		
Did you interact with anyone else while using the application?	yes	shows what other users are doing	1	2	3	4	6	5		
Did the application require you move around the museum?	no		1	2	3	4	6	5		
Did you spend a long time on the application?	you can	multiple smaller games, can't scroll, moves at it's o	1	2	3	4	5	6		
Can you use the app before or after the visit?	no		6	5	4	3	2	1		
Are things "postable"? (high scores, tricks and tips)	no		5	6	4	3	2	1		
Can you upload contents?	no		6	5	4	3	2	1		
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1		
Does the application respond differently depending on how someone	no		2	3	5	4	6	1		
			2	4	6	8	11	11		
Ease of Use										
Are there paper directions?	no									
Are there directions on the application?	no									
Is there someone to help explain the application?	no									
How easy is it to navigate through application?	easy	moves for you								
Integration and Implementation										
Is the application run through a third party application? (For example										
Are museum workers aware of the application?	yes									
What types of technology is the museum using?	installed touchscreen device									
Does the application cover exhibits in the whole museum?	atmosphere exhibit									
Attributes										
Did you play as a character?	No									
Did you play as yourself?	You accomplished the goals of the game, no characters									
Was it a game?	Yes									
Was it informational?	No	maybe not informational enough								
Was there too much to read/listen/watch?	No	but there were long transition times								

Appendix J2: Science Museum News

Museum Name	Response	Comments							
Science Museum- News									
Promotion of application									
Were there signs for the application?		part of exhibit							
How many?		part of exhibit							
Were they informative? What type of information was delivered?	yes	shows clips on what it is going to talk about							
Did they grab your attention?	yes	bold color							
Was it advertised outside the museum?		part of exhibit							
			Creators	Critics	Collectors	Joiners	Spectator	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	indirect	can read other people's comments	1	2	3	4	6	5	
Did the application require you move around the museum?	no	stationary	1	2	3	4	6	5	
Did you spend a long time on the application?	10-15mins	longest time spent at	1	2	3	4	5	6	
Can you use the app before or after the visit?	yes/could	can email yourself or others articles to continue/post comments and others can	6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	yes		5	6	4	3	2	1	
Can you upload contents?	no		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1	
Does the application respond differently depending on how someone uses it?	yes	can navigate your own way through it	2	3	5	4	6	1	
			10	12	15	15	19	13	
Ease of Use									
Are there paper directions?	no								
Are there directions on the application?	no								
Is there someone to help explain the application?	no								
How easy is it to navigate through application?	easy	moves for you							
Integration and Implementation									
Is the application run through a third party application? (For example, social media)									
Are museum workers aware of the application?	yes								
What types of technology is the museum using?		installed touchscreen device							
Does the application cover exhibits in the whole museum?		atmosphere exhibit							
Attributes									
Did you play as a character?	No								
Did you play as yourself?	Yes	You could give your own personal opinions and navigate how you wanted.							
Was it a game?	No								
Was it informational?	Yes								
Was there too much to read/listen/watch?	No	You could read as much or as little as you wanted, depending on what you were interested in.							

Appendix J3: Science Museum Text

Museum Name	Response	Comments							
Science Museum- Text									
Promotion of application									
Were there signs for the application?		part of exhibit							
How many?		part of exhibit							
Were they informative? What type of information was delivered?	yes								
Did they grab your attention?	not much								
Was it advertised outside the museum?		part of exhibit							
			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	no		1	2	3	4	6	5	
Did the application require you move around the museum?	no		1	2	3	4	6	5	
Did you spend a long time on the application?	could, lots of text		1	2	3	4	5	6	
Can you use the app before or after the visit?	no		6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	no		5	6	4	3	2	1	
Can you upload contents?	no		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1	
Does the application respond differently depending on how someone uses it?	no		2	3	5	4	6	1	
			1	2	3	4	5	6	
Ease of Use									
Are there paper directions?	no								
Are there directions on the application?	no								
Is there someone to help explain the application?	no								
How easy is it to navigate through application?	easy	turning pages in a book, does the rest on it's own							
Integration and Implementation									
Is the application run through a third party application? (For example, a website)									
Are museum workers aware of the application?	yes								
What types of technology is the museum using?	fixed screens								
Does the application cover exhibits in the whole museum?	no								
Attributes									
Did you play as a character?	No								
Did you play as yourself?	No	flipped pages in a book							
Was it a game?	No								
Was it informational?	Sort of	There was a lot to read, so it made you not want to read it							
Was there too much to read/listen/watch?	Yes	Too much words, made you not want to read it.							

Appendix J4: Tower of London Escape from the Tower

Museum Name	Response	Comments							
Tower of London- Escape from the Tower									
Promotion of application									
Were there signs for the application?	No								
How many?									
Were they informative? What type of information was delivered?									
Did they grab your attention?									
Was it advertised outside the museum?	Yes	online							
			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	No	Was in a group, so interacted with them however it was not required.	1	2	3	4	6	5	
Did the application require you move around the museum?	Yes	Only to certain places though, and some were repeated so it was boring.	1	2	3	4	6	5	
Did you spend a long time on the application?	Yes	30 mins to use one character of four	1	2	3	4	5	6	
Can you use the app before or after the visit?	No	You could but there would be a lot of guessing or memorization to answer the questions asked in the app	6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	No		5	6	4	3	2	1	
Can you upload contents?	No		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	No		4	3	6	2	5	1	
Does the application respond differently depending on how someone uses it?	Yes	Only if you get something wrong, it will respond accordingly, but gives the same overall story	2	3	5	4	6	1	
			3	5	8	8	11	7	
Ease of Use									
Are there paper directions?	No								
Are there directions on the application?	No	Very self explanatory							
Is there someone to help explain the application?	No								
How easy is it to navigate through application?	Very easy								
Integration and Implementation									
Is the application run through a third party application? (For example, a website)	No								
Are museum workers aware of the application?	Yes								
What types of technology is the museum using?	iPhone/iPad								
Does the application cover exhibits in the whole museum?		covers large sections of the site							
Attributes									
Did you play as a character?	Yes								
Did you play as yourself?	No								
Was it a game?	Yes								
Was it informational?	Yes	Gave some, but skipped over a lot of stuff because you passed by stuff because you were only paying attention to the app							
Was there too much to read/listen/watch?	Yes	Too long to listen to							

Appendix J5: Museum of London Street Museum Londinium

Museum Name	Response	Comments							
Museum of London: Street Museum Londinium									
Promotion of application									
Were there signs for the application?	No								
How many?									
Were they informative? What type of information was delivered?									
Did they grab your attention?									
Was it advertised outside the museum?	Yes	on line							
Enhancement of Visitor Experience									
Did you interact with anyone else while using the application?	No		Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Did the application require you move around the museum?	No	Doesn't require you to even be at the museum, shows different key places in Lond	24	25	27	23	28	20	
Did you spend a long time on the application?	Could spend as much time are you wan	Because you can use it outside the museum can visit the application as many time	1	2	3	4	5	6	
Can you use the app before or after the visit?	Yes	" "	6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	No		5	6	4	3	2	1	
Can you upload contents?	No		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	No		4	3	6	2	5	1	
Does the application respond differently depending on how someone	Yes	You can pick and choose which sites you want to go to	2	3	5	4	6	1	
			9	10	12	11	13	8	
Ease of Use									
Are there paper directions?	No								
Are there directions on the application?	Yes	Easy to understand							
Is there someone to help explain the application?	No								
How easy is it to navigate through application?	Easy	Read directions							
Integration and Implementation									
Is the application run through a third party application? (For example	No								
Are museum workers aware of the application?	Don't know								
What types of technology is the museum using?	Iphone and Ipad								
Does the application cover exhibits in the whole museum?	Covers all of London								
Attributes									
Did you play as a character?	No								
Did you play as yourself?	Yes	dug artifacts							
Was it a game?	Sort of	could dig artifacts, but also there were videos							
Was it informational?	Yes	Just enough information show after digging, and videos short and effective							
Was there too much to read/listen/watch?	No	" "							

Appendix J6: Science Museum Who Am I?

Museum Name	Response	Comments							
Science Museum- Who am I?									
Promotion of application									
Were there signs for the application?									
How many?									
Were they informative? What type of information was delivered?	yes	told you about it as it was going through							
Did they grab your attention?	yes	really weird looking contraption							
Was it advertised outside the museum?		exhibit							
			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	no		1	2	3	4	6	5	
Did the application require you move around the museum?	no		1	2	3	4	6	5	
Did you spend a long time on the application?	yes		1	2	3	4	5	6	
Can you use the app before or after the visit?	no		6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	no		5	6	4	3	2	1	
Can you upload contents?	no		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1	
Does the application respond differently depending on how someone uses it?	no		2	3	5	4	6	1	
			1	2	3	4	5	6	
Ease of Use									
Are there paper directions?	no								
Are there directions on the application?	yes	incorporated in the program							
Is there someone to help explain the application?	no								
How easy is it to navigate through application?	easy	program takes you each step of the way							
Integration and Implementation									
Is the application run through a third party application? (For example, a website)									
Are museum workers aware of the application?	yes								
What types of technology is the museum using?		installed device							
Does the application cover exhibits in the whole museum?	no								
Attributes									
Did you play as a character?	No								
Did you play as yourself?	Yes	used information about yourself to learn and discover new things							
Was it a game?	Yes	they were informative games							
Was it informational?	Yes	Learned a lot about yourself as well as other functions of the body							
Was there too much to read?	No	Good amount of information, ~1 sentence							

Appendix J7: Museum of London Problems in Society

Museum Name	Response	Comments							
Museum of London: Problems in Society									
Promotion of application									
Were there signs for the application?									
How many?									
Were they informative? What type of information was delivered?	Could be better	Told you to tap but didn't necessarily tell you what you were getting into							
Did they grab your attention?	Yes	Big, moving							
Was it advertised outside the museum?									
			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	No	Had a level of interaction, can chat about the answer you wanted to put.	1	2	3	4	6	5	
Did the application require you move around the museum?	No		1	2	3	4	6	5	
Did you spend a long time on the application?	Yes	Spent a lot of time at the exhibit	1	2	3	4	5	6	
Can you use the app before or after the visit?	Could	Don't know as though it was long enough to use more than once	6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	Yes	Your answer became a statistic	5	6	4	3	2	1	
Can you upload contents?	No		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	No		4	3	6	2	5	1	
Does the application respond differently depending on how someone uses it?	Yes	Could chose that path you went, and what you read	2	3	5	4	6	1	
			8	11	12	11	13	8	
Ease of Use									
Are there paper directions?	No								
Are there directions on the application?	No	Told you to tap							
Is there someone to help explain the application?	No	No workers in exhibit							
How easy is it to navigate through application?	Easy								
Integration and Implementation									
Is the application run through a third party application? (For example, a social media site)									
Are museum workers aware of the application?	part of exhibit								
What types of technology is the museum using?	Table Touch								
Does the application cover exhibits in the whole museum?	exhibit								
Attributes									
Did you play as a character?	No								
Did you play as yourself?	Yes	But not in a virtual reality							
Was it a game?	No	Poll-like							
Was it informational?	Yes								
Was there too much to read?	No	Good amount ~2 sentences							

Appendix J8: Museum of London QR Codes

Museum Name	Response	Comments							
Museum of London- QR Codes									
Promotion of application									
Were there signs for the application?	No promotional Signs	It was just the QR code							
How many?									
Were they informative? What type of information was delivered?	Just QR code								
Did they grab your attention?	QR code did only if you were looking specifically at exhibit								
Was it advertised outside the museum?	No								
Enhancement of Visitor Experience			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Did you interact with anyone else while using the application?	No		24	25	27	23	28	20	
Did the application require you move around the museum?	No	Did not ask you too but if interested there was one at many of the exhibits	1	2	3	4	6	5	
Did you spend a long time on the application?	No		1	2	3	4	5	6	
Can you use the app before or after the visit?	No	You wouldn't have the experience, but then when you have it saved on your phone you should be able to go to the website again, when you are home.	6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	No		5	6	4	3	2	1	
Can you upload contents?	No		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	No		4	3	6	2	5	1	
Does the application respond differently depending on how someone uses it?	No		2	3	5	4	6	1	
Ease of Use									
Are there paper directions?	No								
Are there directions on the application?	No								
Is there someone to help explain the application?	No								
How easy is it to navigate through application?	Yes	If you know how to use a QR code it is very easy.							
Integration and Implementation									
Is the application run through a third party application? (For example, a social media app)	QR codes								
Are museum workers aware of the application?	Yes								
What types of technology is the museum using?	QR codes								
Does the application cover exhibits in the whole museum?	Yes								
Attributes									
Did you play as a character?	No								
Did you play as yourself?	No								
Was it a game?	No								
Was it informational?	Yes								
Was there too much to read?	No	Good amount of time, there was a good mixture between audio and video							

Appendix J9: Tate Interactive

Museum Name	Response	Comments							
Tate- Interactive									
Promotion of application									
Were there signs for the application?	banners stating "interactive zone"								
How many?	over the area								
Were they informative? What type of information was delivered?	no								
Did they grab your attention?	yes bright red								
Was it advertised outside the museum?	no								
			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	no		1	2	3	4	6	5	
Did the application require you move around the museum?	no		1	2	3	4	6	5	
Did you spend a long time on the application?	yes		1	2	3	4	5	6	
Can you use the app before or after the visit?	no		6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	yes	there were points where you could chose an option and you could see ther percent	5	6	4	3	2	1	
Can you upload contents?	no		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1	
Does the application respond differently depending on how someone	yes	you could chose what you were interested as well as if you watned games or infor	2	3	5	4	6	1	
			8	11	12	11	13	8	
Ease of Use									
Are there paper directions?	no								
Are there directions on the application?	yes	as you used it it told you what you needed to do							
Is there someone to help explain the application?	yes	there were people walking around							
How easy is it to navigate through application?	easy	the application told you what to do							
Integration and Implementation									
Is the application run through a third party application? (For example	no								
Are museum workers aware of the application?	yes								
What types of technology is the museum using?	fixed touch screen								
Does the application cover exhibits in the whole museum?	yes	covered many types of art that is included throughout the museum							
Attributes									
Did you play as a character?	no								
Did you play as yourself?	yes	you posted your percents and opinion,no characters							
Was it a game?	parts were games	included things like matching							
Was it informational?	yes								
Was there too much to read?	**								

Appendix J10: Tate Artists Interactive

Museum Name	Response	Comments							
Tate - Artists Interactive									
Promotion of application									
Were there signs for the application?	Yes	Banners							
How many?	over the area								
Were they informative? What type of information was delivered?	no								
Did they grab your attention?	bright red								
Was it advertised outside the museum?	no								
			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	no		1	2	3	4	6	5	
Did the application require you move around the museum?	no		1	2	3	4	6	5	
Did you spend a long time on the application?	yes		1	2	3	4	5	6	
Can you use the app before or after the visit?	no		6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	no		5	6	4	3	2	1	
Can you upload contents?	no		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1	
Does the application respond differently depending on how someone uses it?	Yes	Option to watch videos about many different artists	2	3	5	4	6	1	
			3	5	8	8	11	7	
Ease of Use									
Are there paper directions?	no								
Are there directions on the application?	Yes	"Press a picture to watch a video"							
Is there someone to help explain the application?	yes	staff in the area							
How easy is it to navigate through application?	easy	intuitive							
Integration and Implementation									
Is the application run through a third party application? (For example, a website)	no								
Are museum workers aware of the application?	yes								
What types of technology is the museum using?	fixed touch screen								
Does the application cover exhibits in the whole museum?	yes	art/artists							
Attributes									
Did you play as a character?	no								
Did you play as yourself?	no								
Was it a game?	no								
Was it informational?	yes								
Was there too much to read?	no	only videos							

Appendix J11: Kings Cross Station

Museum Name	Response	Comments							
Kings Cross									
Promotion of application									
Were there signs for the application?	no								
How many?									
Were they informative? What type of information was delivered?									
Did they grab your attention?									
Was it advertised outside the museum?	yes	online/online newspaper article							
			Creators	Critics	Collectors	Joiners	Spectators	Inactives	
Enhancement of Visitor Experience			24	25	27	23	28	20	
Did you interact with anyone else while using the application?	possible but no		1	2	3	4	6	5	
Did the application require you move around the museum?	yes	followed your location using GPS, or you could use it manually at your leisure	1	2	3	4	6	5	
Did you spend a long time on the application?	yes	there are multiple sites on original application as well as an add on application with more sites, could chose which to g	1	2	3	4	5	6	
Can you use the app before or after the visit?	as reference	you can use it manually but does not show images of the locations, so without going you would know less about what	6	5	4	3	2	1	
Are things "postable"? (high scores, tricks and tips)	no		5	6	4	3	2	1	
Can you upload contents?	no		6	5	4	3	2	1	
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1	
Does the application respond differently depending on how someone	yes	you could navigate it yourself but moving or clicking	2	3	5	4	6	1	
			5	9	14	16	23	17	
Ease of Use									
Are there paper directions?	no								
Are there directions on the application?	yes	told you what to do in four steps and gives you an audio introduction							
Is there someone to help explain the application?	no								
How easy is it to navigate through application?	easy	would be easy to walk around and it would automatically know where you were							
Integration and Implementation									
Is the application run through a third party application? (For example	no								
Are museum workers aware of the application?									
What types of technology is the museum using?	iPhone, iPad	***							
Does the application cover exhibits in the whole museum?	yes	covered a lot of the area							
Attributes									
Did you play as a character?	no								
Did you play as yourself?	you moved around as yourself								
Was it a game?	no								
Was it informational?	yes	very interesting, iddn't seem rehearsed, conversational, you can hear background noise to make you feel like you were there							
Was there too much to read?	no	good amount ~1:20 again conversational not boring							

Appendix J12: Natural History Museum Darwin Exhibit

Museum Name	Response	Comments								
Natural History Museum- Darwin Exhibit										
Promotion of application										
Were there signs for the application?	no									
How many?	over the area									
Were they informative? What type of information was delivered?	no									
Did they grab your attention?	no									
Was it advertised outside the museum?	no									
			Creators	Critics	Collectors	Joiners	Spectator	Inactives		
Enhancement of Visitor Experience			24	25	27	23	28	20		
Did you interact with anyone else while using the application?	no		1	2	3	4	6	5		
Did the application require you move around the museum?	yes		1	2	3	4	6	5		
Did you spend a long time on the application?	average	20- 30 minutes, can continue the expe	1	2	3	4	5	6		
Can you use the app before or after the visit?	no		6	5	4	3	2	1		
Are things "postable"? (high scores, tricks and tips)	no		5	6	4	3	2	1		
Can you upload contents?	no		6	5	4	3	2	1		
Does the application give you updates or notifications as you use it?	no		4	3	6	2	5	1		
Does the application respond differently depending on how someone uses it?	yes		2	3	5	4	6	1		
			4	7	11	12	17	12		
Ease of Use										
Are there paper directions?	yes									
Are there directions on the application?	no									
Is there someone to help explain the application?	yes									
How easy is it to navigate through application?	difficult to understand at first									
Integration and Implementation										
Is the application run through a third party application? (For example SCVNGR)	no									
Are museum workers aware of the application?	yes									
What types of technology is the museum using?	table touch									
Does the application cover exhibits in the whole museum?	no									
Attributes										
Did you play as a character?	no									
Did you play as yourself?	yes									
Was it a game?	no									
Was it informational?	yes									
Was there too much to read/listen/watch?	yes	lots of videos								

Appendix K: Short Quantitative Visitor Survey

Tower of London Digital Media Visitor Survey

Time (24 hr clock): |__|_|_|_|_| | Date (DD/MM/YY): |__|_|_|_|_|_|_|_|

Preamble

Hi, my name is and I'm working on behalf of the Tower of London. We are looking to find out more about our visitors and how technology can improve their experience here at the Tower. May I have a few minutes of your time for a brief survey?

Thank you. Please do not feel pressured to answer in any particular way. We won't be offended by any negative responses.

I'm going to ask you a few questions and record them on my sheet. I just want to assure you that this survey is completely anonymous and all responses will be kept confidential, would this be ok with you?

Part 1: Visitor Segmentation

1. Is English your first language?

Yes

No

a. If not, what language do you speak most often? (end survey if the visitor does not speak English)

2. What country are you from?

3. How many people are in your party?

a. Which age range does each member of your party fall under?
(Showcard 1)

Respondent's Age Range	Age Range of others in party					

4. Which one of these most closely describes your main reason for visiting the Tower today?
(Showcard 2 or 3)

- a. Because the Tower is a must see site
- b. To feel what life was like in the past at the Tower
- c. To find out more about specific characters or events associated with the Tower
- d. To follow a professional or academic interest
- e. To get away from the stresses of everyday life
- f. It was something the children wanted to do
- g. To encourage the children's interests or learning, as well as having fun

Part 2: Use of Technology

1. Do you own a smart phone or a tablet?

- Yes No

a. If yes, which one? Smart phone, tablet or both?

- Smart phone Tablet Both

b. What type of is it? (Showcard 4)

- iPhone/iPad/iPod Touch b. Android c. Windows
 d. Blackberry e. Not Sure/Other: _____

c. If yes, do you have it with you?

- Yes No

2. Have you ever used an app at a museum or heritage site?

- Yes No Not Sure

3. If there were an app at the Tower would you prefer to download it here or elsewhere?

- At the Tower Elsewhere No Preference

a. If at the Tower, would you prefer it through 3G or Wi-Fi?

- 3G Wi-Fi No Preference

4. Do you use social media sites such as Facebook or Twitter?

Yes No

a. Which of these sites do you use? (Showcard 5)

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> 1. Facebook | <input type="checkbox"/> f. MySpace |
| <input type="checkbox"/> 2. Twitter | <input type="checkbox"/> g. YouTube |
| <input type="checkbox"/> 3. LinkedIn | <input type="checkbox"/> h. Tumblr |
| <input type="checkbox"/> 4. Google+ | <input type="checkbox"/> i. Flickr |
| <input type="checkbox"/> 5. Foursquare | <input type="checkbox"/> j. Pinterest |
| <input type="checkbox"/> k. Any Other: _____ | |

b. Have you used the tagging, voting, or liking features on any of these sites?

Yes No

c. How often do you post or comment on a social media site? (Showcard 6)

- | | |
|---|--|
| <input type="checkbox"/> a. Several times a day | <input type="checkbox"/> d. Once a week |
| <input type="checkbox"/> b. Once a day | <input type="checkbox"/> e. Never |
| <input type="checkbox"/> c. Twice a week | <input type="checkbox"/> f. Any other: _____ |

5. Do you do any of the following online activities? (Showcard 7)

- | | |
|---|---|
| <input type="checkbox"/> a. Publish your own blog | <input type="checkbox"/> c. Upload videos/audio/music |
| <input type="checkbox"/> b. Publish your own websites | <input type="checkbox"/> d. Write Online Articles |

a. How often do you publish/upload content? (Showcard 8)

- | | |
|---|--|
| <input type="checkbox"/> 1. Several times a day | <input type="checkbox"/> d. Once a week |
| <input type="checkbox"/> 2. Once a day | <input type="checkbox"/> e. Never |
| <input type="checkbox"/> 3. Twice a week | <input type="checkbox"/> f. Any other: _____ |

6. Did you visit the Tower of London/Historic Royal Palaces website in advance of your visit here today?

Yes No Not Sure

7. Do you plan to visit the Tower of London/Historic Royal Palaces website after your visit here today?

Yes No Not Sure

Thank you for your time. Enjoy the rest of your visit!

Time (24 hr clock): |__|__|__|__|

Interviewer: _____

Location: _____

Appendix L: In-depth Qualitative Visitor Survey

Tower of London Digital Media Visitor Survey

Time (24 hr clock): |__|_|_|_|_|_| Date (DD/MM/YY): |__|_|_|_|_|_|_|_|_|

Preamble

Hi, my name is and I'm working on behalf of the Tower of London. We are looking to find out more about our visitors and how technology can improve their experience here at the Tower. May I have a few minutes of your time for a brief survey?

Thank you. Please do not feel pressured to answer in any particular way. We won't be offended by any negative responses.

I'm going to ask you a few questions and record them on my sheet. I just want to assure you that this survey is completely anonymous and all responses will be kept confidential, would this be ok with you?

5. How many people are in your party?

- _____
- a. Which age range does each member of your party fall under?
(Showcard 1)

Respondent's Age Range	Age Range of others in party					

6. Which one of these most closely describes your main reason for visiting the Tower today?
(Showcard)

- a. Because the Tower is a must see site
- b. To feel what life was like in the past at the Tower
- c. To learn more about specific characters or events associated with the Tower
- d. To follow a professional or academic interest
- e. To get away from the stresses of everyday life
- f. It was something the children wanted to do
- g. To encourage the children's interests or learning, as well as having fun

7. Do you use social media sites such as Facebook or Twitter?

Yes No

a. Which of these sites do you use? (Showcard)

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> 1. Facebook | <input type="checkbox"/> f. MySpace |
| <input type="checkbox"/> 2. Twitter | <input type="checkbox"/> g. YouTube |
| <input type="checkbox"/> 3. LinkedIn | <input type="checkbox"/> h. Tumblr |
| <input type="checkbox"/> 4. Google+ | <input type="checkbox"/> i. Flickr |
| <input type="checkbox"/> 5. Foursquare | <input type="checkbox"/> j. Pinterest |
| <input type="checkbox"/> k. Any Other: _____ | |

b. How often do you post or comment on a social media site? (Showcard)

- | | |
|---|--|
| <input type="checkbox"/> d. Several times a day | <input type="checkbox"/> d. Once a week |
| <input type="checkbox"/> e. Once a day | <input type="checkbox"/> e. Never |
| <input type="checkbox"/> f. Twice a week | <input type="checkbox"/> f. Any other: _____ |

8. Do you do any of the following online activities? (Showcard)

- | | |
|---|---|
| <input type="checkbox"/> a. Publish your own blog | <input type="checkbox"/> c. Upload videos/audio/music |
| <input type="checkbox"/> b. Publish your own websites | <input type="checkbox"/> d. Write Online Articles |

a. How often do you publish/upload content? (Showcard)

- | | |
|---|--|
| <input type="checkbox"/> a. Several times a day | <input type="checkbox"/> d. Once a week |
| <input type="checkbox"/> b. Once a day | <input type="checkbox"/> e. Never |
| <input type="checkbox"/> c. Twice a week | <input type="checkbox"/> f. Any other: _____ |

9. Do you own a smart phone or a tablet?

Yes No

a. If yes, which one? Smart phone, tablet or both?

Smart phone Tablet Both

b. What type of is it? (Showcard)

- | | | |
|--|---|-------------------------------------|
| <input type="checkbox"/> a. iPhone/iPad/iPod Touch | <input type="checkbox"/> b. Android | <input type="checkbox"/> c. Windows |
| <input type="checkbox"/> d. Blackberry | <input type="checkbox"/> e. Not Sure/Other: _____ | |

c. If yes, do you have it with you?

Yes No

10. Which apps do you enjoy using most on your smart phone, tablet or touch screen device?
What features do you most enjoy in those apps?

11. Have you used mobile apps at other heritage sites, museums, or attractions?

Yes

No

a. If yes, which ones? What did you like or dislike?

12. Do you think a mobile app could make your experience today better? How?

13. Which of the following do you think you would enjoy most in an app at the Tower of London? Choose up to two (Showcard):

- a. Hearing the sounds that filled the Tower years ago (audio/video guide)
- b. Virtual curators to tell you more about the historic place you are in (exhibit interpretation)
- c. Going on a quest through an exhibit finding important characters and stories (games)
- d. Going on a character led tour through an exhibit (self-guided tours)
- e. Seeing what the Tower looked like years ago (augmented reality)
- f. Any Other: _____

a. Box below also used for general visitor comments

14. What was your favorite part about your visit to the Tower? Or what are you most looking forward to at the Tower? Why?

15. Did you feel anything was missing in your visit today? If so, what?

16. If there were an app at the Tower of London would you use it?

Yes No Not Sure

Thank you for your time. Enjoy the rest of your visit!

Time (24 hr clock): |__|__|__|__|

Interviewer: _____

Location: _____

Appendix M: Short Qualitative Survey Data

1.1	1.2	1.3	1.4	2.1			2.2	2.3		2.4			2.5		2.6	2.7
a		a		a	b	c		a	a	b	c	a				
yes n/a	England	1 fffj	a	Yes Smart phone	c	Yes	No	elsewhere n/a	Yes abd	g	Yes a	acd c	No	No		
yes n/a	USA	2 hh	c	yes Smart phone	d	no	no	tower wifi	yes abd	g	yes b	abc b	no	no		
yes n/a	England	2 jj	a	no n/a	n/a	n/a	n/a	n/a n/a	no n/a	n/a	n/a n/a	n/a n/a	yes	yes		
yes n/a	England	2 hh	e	yes Smart phone	b	yes	no	tower wifi	yes a		yes a	c d	yes	yes		
no Flemish	Belgium	2 jk	c	no n/a	n/a	n/a	n/a	n/a n/a	no n/a	n/a	n/a n/a	n/a n/a	yes	not sure		
yes n/a	England	2 hk	a	yes Smart phone	d	yes	no	elsewhere wifi	yes ad	g	no a	n/a n/a	yes	no		
no French	Canada	2 ii	a	no n/a	n/a	n/a	n/a	no pref n/a	yes g		no n/a	n/a n/a	no	not sure		
no German	Germany	3 gii	ac	yes both	a	yes	no	elsewhere n/a	yes ad	g	no f	cd d	yes	yes		
no Urdu	Pakistan	4 fffj	a	yes Smart phone	a	yes	no	tower wifi	yes cg	hi	yes b	n/a n/a	no	yes		
yes n/a	USA	2 hk	c	no n/a	n/a	n/a	n/a	n/a n/a	yes a		no e	n/a n/a	no	no		
no Hebrew	Israel	2 di	b	no n/a	b	n/a	n/a	n/a n/a	yes ag		yes a	n/a n/a	no	yes		
yes n/a	Canada	2 ee	a	yes Smart phone	b	no	no	tower wifi	yes ag		yes b	c e	no	no		

no	German	Germany	3	fff	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	a	yes	d	b	d	yes	no
yes	n/a	USA	4	hijk	a	yes	both	a	yes	yes	no pref	wifi	yes	abcdegijk	yes	a	bc	d	yes	yes
no	German	Germany	3	iib	afg	no	n/a	n/a	n/a	n/a	no pref	n/a	no	n/a	n/a	n/a	n/a	n/a	no	no
yes	n/a	Scotland	2	ff	a	yes	Smart phone	a	yes	no	no pref	n/a	no	n/a	n/a	n/a	n/a	n/a	no	no
yes	n/a	Iceland	1	h	b	yes	Smart phone	e.	yes	no	elsewhere	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	no
yes	n/a	England	2	hi	a	yes	Smart phone	a	no	no	no pref	n/a	no	n/a	n/a	n/a	n/a	n/a	no	yes
yes	n/a	Canada	2	ee	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	ag	yes	f	c	f	no	no
yes	n/a	USA	4	jdgi	b	yes	both	a	yes	yes	no pref	n/a	yes	a	no	d	c	d	no	no
yes	n/a	USA	2	gg	a	yes	both	ab	no	no	tower	wifi	yes	cb	no	d	ad	d	no	yes
no	German	Germany	3	iic	a	no	n/a	n/a	n/a	n/a	n/a	n/a	no	n/a	no	n/a	n/a	n/a	no	yes
yes	n/a	USA	2	hc	a	yes	Smart phone	b	yes	yes	Elsewhere	n/a	yes	ag	yes	a	n/a	n/a	yes	yes
no	Spanish	Spain	2	ii	c	yes	Smart phone	sony	yes	no	tower	wifi	yes	a	no	n/a	c	b	no	no
yes	n/a	USA	4	habh	a	yes	Smart phone	b	no	no	Elsewhere	n/a	yes	abce	yes	a	bc	f	yes	no
yes	n/a	USA	1	i	c	yes	tablet	a	no	not sure	elsewhere	n/a	no	n/a	n/a	n/a	c	f	no	not sure
no	Romanian	Germany	2	gg	b	yes	both	abd	yes	yes	elsewhere	n/a	yes	adg	yes	d	ac	f	no	no
yes	n/a	USA	3	ibi	a	no	n/a	n/a	n/a	no	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	no	no
yes	n/a	USA	3	led	a	yes	Smart phone	a	yes	no	tower	wifi	yes	aj	yes	b	n/a	n/a	yes	no

yes	n/a	Canada	5	llllk	b	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	agj	yes	d	c	d	no	yes
no	Spanish	Mexico	2	hg	a	yes	Smart phone	b	yes	no	tower	wifi	yes	adg	yes	d	n/a	n/a	no	yes
yes	n/a	England	4	hbc	a	no	n/a	n/a	n/a	no	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	not sure
yes	n/a	USA	2	fi	c	yes	Smart phone	d	yes	no	no pref	no pref	yes	a	yes	d	n/a	n/a	no	no
no	Chinese	China	2	ff	b	yes	Smart phone	a	yes	no	tower	wifi	yes	a	no	e	ac	b	no	yes
yes	Hebrew	USA	2	ee	b	yes	Smart phone	a	yes	not sure	tower	wifi	yes	ab	yes	b	c	f	no	not sure
yes	n/a	England	5	idcci	b	yes	Smart phone	b	yes	no	elsewhere	n/a	yes	a	yes	c	n/a	n/a	no	not sure
yes	n/a	USA	2	gh	a	yes	tablet	a	no	no	elsewhere	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	not sure
yes	n/a	USA	2	ii	a	yes	Smart phone	a	yes	no	tower	wifi	yes	a	yes	a	c	d	no	no
yes	n/a	USA	6	dddddd	a	yes	Smart phone	a	yes	no	tower	wifi	yes	ah	yes	a	n/a	n/a	no	no
yes	n/a	USA	4	dddd	d	yes	Smart phone	a	yes	no	tower	wifi	yes	abh	yes	a	a	b	no	not sure
no	German	Germany	2	fgj	ac	yes	Smart phone	a	yes	no	elsewhere	n/a	yes	a	yes	c	n/a	n/a	no	not sure
yes	n/a	USA	3	ddd	d	yes	Smart phone	a	yes	no	tower	wifi	yes	abgh	yes	a	n/a	n/a	no	no
no	German	Germany	2	jb	f	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	a	no	n/a	n/a	n/a	yes	yes

yes	n/a	England	4	hbai	a	yes	Smart phone	a	yes	yes	no pref	n/a	no	n/a	n/a	n/a	n/a	yes	no	
yes	n/a	England	4	aahh	f	yes	tablet	a	no	no	elsewhere	n/a	no	n/a	n/a	n/a	n/a	yes	yes	
yes	n/a	USA	3	fii	g	yes	both	b	no	no	tower	3G	yes	a	yes	c	c	d	no	no
Yes	n/a	USA	2	ff	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	abcgj	yes	a	a	f	no	no
Yes	n/a	Canada	2	ff	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	adeg	yes	b	n/a	n/a	no	no
Yes	n/a	USA	2	lk	c	yes	Smart phone	a	yes	no	elsewhere	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	no
Yes	n/a	USA	4	hhhh	a	yes	Smart phone	b	yes	no	elsewhere	n/a	yes	ag	yes	b	n/a	n/a	no	no
Yes	n/a	India	1	g	a	yes	Smart phone	b	yes	no	elsewhere	n/a	yes	a	yes	a	c	d	no	no
No	Mandarin	China	6	iiiihh	a	yes	both	a	yes	no	no pref	no pref	yes	ag	yes	b	c	f	no	no
Yes	n/a	USA	4	hiao	f	yes	Smart phone	ad	yes	no	tower	3G	no	n/a	n/a	n/a	n/a	n/a	no	not sure
no	French	Canada	2	gg	a	yes	Smart phone	a	yes	no	no pref	n/a	yes	a	yes	d	n/a	n/a	no	no
no	Japanese	Japan	2	ii	a	yes	Smart phone	d	yes	no	elsewhere	n/a	no	n/a	n/a	n/a	n/a	n/a	no	not sure
no	German	Australia	3	kag	a	yes	both	b	no	no	no pref	n/a	yes	a	yes	f	n/a	n/a	no	no
no	German	Germany	3	hc	b	yes	Smart phone	b	no	no	no pref	n/a	yes	a	yes	c	n/a	n/a	no	not sure
yes	n/a	England	4	hhab	a	yes	Smart phone	a	yes	no	tower	wifi	yes	a	no	n/a	n/a	n/a	yes	no
yes	n/a	England	3	hja	g	yes	both	a	yes	no	elsewhere	n/a	yes	acg	yes	c	n/a	n/a	no	yes

yes	n/a	USA	4	hjjj	b	yes	both	a	no	no	elsewhere	n/a	yes	ad	yes	c	n/a	n/a	no	yes
no	Dutch	Belgium	2	gg	b	yes	Smart phone	a	yes	yes	elsewhere	n/a	yes	a	yes	d	n/a	n/a	no	no
yes	n/a	USA	2	hh	a	yes	Smart phone	a	yes	no	tower	wifi	yes	adgj	yes	d	n/a	n/a	no	yes
No	Portuguese	Portugal	4	hhh	a	yes	Smart phone	a	no	no	elsewhere	n/a	no	n/a	n/a	n/a	n/a	n/a	no	yes
Yes	n/a	USA	2	ic	a	yes	Smart phone	a	yes	no	no pref	n/a	yes	acgh	yes	c	n/a	n/a	no	sure
Yes	n/a	USA	1	f	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	a	yes	d	n/a	n/a	no	no
Yes	n/a	USA	1	f	d	yes	Smart phone	b	no	no	elsewhere	n/a	yes	abc	yes	d	a	d	no	yes
Yes	n/a	England	1	lb	g	no	n/a	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	not sure
Yes	n/a	England	2	gg	b	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	ab	yes	b	n/a	n/a	yes	sure
Yes	n/a	England	2	ff	a	yes	Smart phone	d	yes	no	no pref	n/a	yes	abg	yes	d	n/a	n/a	yes	yes
No	Portuguese	Portugal	4	hhgh	a	yes	Smart phone	b	yes	no	no pref	n/a	yes	afg	yes	d	ab	f	yes	sure
Yes	n/a	New Zealand	2	gh	a	yes	tablet	a	yes	no	elsewhere	n/a	yes	acgi	yes	b	b	f	no	no
No	German	Germany	2	ef	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	ag	yes	a	n/a	n/a	yes	no
Yes	Russian	Kazakhstan	2	hj	a	yes	tablet	a	no	no	elsewhere	wifi	yes	a	yes	d	n/a	n/a	yes	no
yes	n/a	England	3	jja	a	yes	tablet	a	no	no	elsewhere	wifi	no	n/a	n/a	n/a	n/a	n/a	no	yes
no	Danish	Denmark	4	iiaa	g	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	abcg	no	e	c	f	no	no

yes	n/a	USA	7	lhhhccb	a	yes	both	a	yes	yes	tower	3g	yes	acegi	yes	b	c	d	no	no
yes	n/a	South Africa	19	e	a	yes	Smart phone	a	yes	not sure	no pref	n/a	yes	abd	yes	c	c	d	no	not sure
yes	n/a	England	3	hhb	g	yes	both	a	yes	no	elsewhere	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	yes
yes	n/a	England	4	iicd	g	yes	both	a	yes	no	elsewhere	n/a	yes	abcg	no	f	n/a	n/a	yes	no
yes	n/a	England	11	ilhhhhbbbbb	g	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	adg	yes	a	n/a	n/a	yes	no
yes	n/a	India	1	g	b	yes	Smart phone	b	yes	no	tower	no pref	yes	acd	no	b	n/a	n/a	no	yes
no	Dutch	Netherlands	2	gf	a	ye	both	a	yes	no	tower	wifi	yes	abcdegij	yes	a	n/a	n/a	yes	no
yes	n/a	Australia	3	fff	a	yes	Smart phone	d	yes	no	tower	wifi	yes	abg	yes	b	a	b	yes	no
yes	n/a	USA	4	ffii	a	yes	Smart phone	a	no	no	no pref	n/a	yes	ach	yes	b	a	d	no	no
yes	n/a	England	1	h	a	yes	Smart phone	a	yes	no	no pref	n/a	yes	ac	yes	d	n/a	n/a	no	no
yes	n/a	Canada	3	jjk	b	yes	Smart phone	a	yes	yes	tower	wifi	yes	a	yes	d	n/a	n/a	yes	not sure
yes	n/a	Canada	2	kk	c	no	n/a	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	not sure
yes	n/a	Australia	3	ffg	a	yes	Smart phone	a	yes	no	no pref	n/a	yes	ab	yes	a	n/a	n/a	no	no
yes	n/a	Canada	4	jjjk	abc	yes	both	a	yes	no	no pref	n/a`	no	n/a	n/a	n/a	n/a	n/a	yes	yes
no	French	France	2	hb	b	no	n/a	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	not sure

yes	n/a	England	4	ggjj	cd	yes	both	abd	yes	no	tower	wifi	yes	acg	yes	c	n/a	n/a	yes	yes	
yes	n/a	USA	2	gg	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	a	yes	d	n/a	n/a	yes	no	
yes	n/a	USA	2	gg	a	yes	Smart phone	a	yes	yes	elsewhere	n/a	yes	adg	no	n/a	n/a	n/a	n/a	yes	no
yes	n/a	England	3	hhg	g	yes	both	a	yes	no	elsewhere	n/a	yes	acg	yes	a	bc	d	no	yes	
yes	n/a	USA	2	ld	g	yes	Smart phone	a	yes	no	tower	wifi	yes	abcg	yes	d	n/a	n/a	no	yes	
yes	n/a	Australia	2	hg	b	yes	Smart phone	a	yes	yes	elsewhere	n/a	yes	acg	yes	c	n/a	n/a	yes	not sure	
yes	n/a	USA	3	lll	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	adg	no	n/a	c	f	no	sure	
yes	n/a	England	2	gg	e	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	g	yes	b	n/a	n/a	yes	no	
no	Spanish	Mexico	2	gb	a	yes	Smart phone	a	yes	yes	tower	wifi	yes	abc	yes	a	n/a	n/a	yes	yes	
yes	n/a	New Zealand	3	ggg	a	yes	Smart phone	a	yes	no	tower	wifi	yes	a	yes	c	c	d	no	no	
yes	n/a	USA	6	gggggg	b	yes	Smart phone	a	yes	no	tower	wifi	yes	acdgi	yes	a	c	d	yes	no	
yes	n/a	USA	4	ffff	a	yes	Smart phone	a	yes	yes	tower	wifi	yes	abcdej	yes	a	n/a	n/a	yes	yes	
yes	n/a	USA	1	h	a	yes	Smart phone	a	yes	no	tower	wifi	no	n/a	n/a	n/a	n/a	n/a	no	sure	
yes	n/a	Sweden	4	habi	f	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	acd	no	n/A	n/a	n/a	no	sure	
no	Czech	Czech Republic	5	habag	a	yes	Smart phone	b	yes	no	no pref	n/a	yes	ac	yes	f	n/a	n/a	no	yes	
yes	n/a	England	2	ii	c	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	a	yes	d	n/a	n/a	yes	not	

yes	n/a	USA	2	hh	a	yes	both	ab	yes	no	no pref	n/a	yes	a	yes	b	n/a	n/a	no	sure
yes	n/a	USA	4	ffff	a	yes	Smart phone	a	yes	no	elsewhere	n/a	yes	abcd	yes	a	a	d	yes	no
yes	n/a	Austria	4	hhbb	a	yes	both	a	yes	yes	no pref	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	not sure
yes	n/a	England	4	gggg	a	yes	both	a	yes	yes	no pref	n/a	yes	abcdh	yes	a	n/a	n/a	yes	no
yes	n/a	USA	5	hilbc	a	yes	tablet	b	no	no	no pref	n/a	yes	abcdg	yes	c	abcd	d	yes	not sure
yes	n/a	USA	1	f	a	yes	both	a	yes	no	no pref	n/a	yes	abg	yes	b	c	f	no	no
yes	n/a	USA	3	hbg	b	yes	both	ab	yes	no	tower	wifi	yes	abdg	no	b	n/a	n/a	no	yes
yes	n/a	USA	2	jk	a	yes	both	a	b	yes	elsewhere	n/a	no	n/a	n/a	n/a	c	d	yes	no
yes	n/a	USA	3	fff	a	yes	Smart phone	a	no	no	no pref	n/a	yes	abcdg	yes	a	n/a	n/a	no	yes
yes	n/a	England	2	hg	c	yes	Smart phone	d	yes	no	no pref	n/a	yes	abcfgi	yes	f	n/a	n/a	yes	yes
yes	n/a	England	5	iigkk	a	yes	both	a	yes	no	elsewhere	n/a	yes	abcdg	yes	c	a	c	yes	not sure
yes	n/a	USA	4	iicd	a	yes	both	a	yes	yes	tower	wifi	yes	abcdg	yes	d	acd	d	no	yes
yes	n/a	Australia	2	hj	a	yes	Smart phone	a	yes	no	tower	wifi	yes	adi	yes	d	c	c	no	yes
yes	n/a	USA	4	fhll	a	yes	both	ab	no	yes	no pref	n/a	yes	acdg	yes	f	b	f	no	not sure

yes	n/a	England	2	hg	a	yes	Smart phone	a	yes	no	tower	wifi	yes	a	yes	d	n/a	n/a	no	no
yes	n/a	India	2	gg	ab	yes	Smart phone	d	yes	no	no pref	n/a	yes	abc	yes	f	n/a	n/a	no	not sure
no	Finnish	Finland	2	il	g	no	n/a	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	no	yes
yes	n/a	England	5	hghb	g	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	ag	no	n/a	n/a	n/a	yes	yes
no	Danish	Denmark	2	gg	a	yes	Smart phone	b	yes	no	tower	wifi	yes	acg	yes	f	b	f	no	not sure
yes	n/a	USA	4	hhab	b	yes	Smart phone	a	yes	no	elsewhere	n/a	yes	a	yes	a	c	f	no	yes
yes	n/a	Australia	4	hhce	a	yes	both	ab	yes	no	no pref	n/a	yes	ag	yes	b	e	b	no	not sure
yes	n/a	England	2	gg	a	yes	Smart phone	abd	yes	no	elsewhere	n/a	yes	a	no	n/a	n/a	n/a	yes	not sure
yes	n/a	Wales	6	habbhll	a	yes	Smart phone	b	yes	no	tower	no pref	yes	abg	no	n/a	n/a	n/a	yes	yes
no	German	Germany	2	hh	a	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	a	no	n/a	n/a	n/a	yes	no
yes	n/a	England	4	bbil	f	yes	Smart phone	a	yes	no	no pref	n/a	yes	a	no	n/a	n/a	n/a	no	yes
no	Spanish	Spain	2	gg	c	yes	Smart phone	b	no	no	no pref	n/a	yes	a	yes	d	n/a	n/a	no	yes
yes	n/a	USA	4	kkkk	a	yes	both	ad	yes	no	tower	no pref	yes	a	yes	f	n/a	n/a	no	no
no	Latvia	Latvia	5	ffggi	b	yes	Smart phone	a	yes	yes	tower	3g	yes	acg	yes	rarely	n/a	n/a	no	no
yes	n/a	England	2	ll	f	no	n/a	n/a	n/a	n/a	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	no	no

no	Russian	Lithuania	2	hh	a	no	n/a	n/a	n/a/	n/	n/a	n/a	no	n/a	n/a	n/a	n/a	n/a	yes	yes
yes	n/a	England	4	iiab	a	yes	Smart phone	a	yes	no	tower	3g	no	n/a	n/a	n/a	n/a	n/a	yes	yes
yes	n/a	USA	2	gh	a	yes	Smart phone	a	yes	no	elsewhere	n/a	yes	ab	no	d	n/a	n/a	no	yes
yes	n/a	South Africa	3	gg	a	yes	both	ad	no	no	elsewhere	n/a	yes	abcdg	yes	a	c	f	no	no
yes	n/a	Whales	2	ff	e	yes	both	a	no	no	elsewhere	n/a	yes	ag	no	n/a	n/a	n/a	no	no
no	Spanish	Spain	7	iiigggg	a	yes	Smart phone	a	yes	yes	no pref	n/a	yes	ag	yes	b	a	b	no	yes
no	German	Germany	4	hiab	b	yes	both	ab	yes	no	no pref	wifi	yes	a	yes	d	n/a	n/a	yes	no
yes	n/a	England	3	gga	b	no	n/a	n/a	n/a	n/a	n/a	n/a	yes	adg	yes	a	e	b	yes	yes
no	Italian	Italy	3	ide	a	yes	both	a	yes	no	tower	3g	yes	ab	yes	b	n/a	n/a	yes	yes

Appendix N: In Depth Qualitative Survey Data

1	App	2	3	4		5		6		7		8		9	12		
	a		a	b	a	a	b	c		a							
4	iibl	a	n o	n/a	n/ a	cd	d	ye s	Smart phone	d	no	Food, Animals	No	Yes, map	be	Yes	
4	hiab	a	n o	n/a	n/ a	c	c	ye s	Smart phone	b	yes	Maps	No	Possibly	b	Yes	
3	hhb	a	ye s	c	d	n/ a	n/ a	ye s	Smart phone	a	yes	Traveling Information, Social	Yes	France Museum of Paris	Yes, More information on Tower	b	Yes
3	iib	g	ye s	acj	b	n/ a	n/ a	ye s	Both	b	no	Google, Navigator	No	Probably, on your own phone, **at your own pace	bc	Yes	
3	hci	b	ye s	a	c	c	d	ye s	Both	a	yes	Games, Maps, Help	No	Yes, More information at site	ad e	Yes	
1	f	a	ye s	abdg	a	n/ a	n/ a	ye s	Smart phone	a	no	Games	Yes	Tate, lot's of drivers, it broke	yes, more information, highlight information	ce	Yes
4	iifb	b	ye s	adg	b	n/ a	n/ a	ye s	Both	b	yes	Facebook, Games	No	yes, map	be	Yes	
4	hhab	g	ye	abgi	d	n/	n/	Ye	Smart phone	a	yes	games, satalite	No	Yes, Game or Quest	ac	Yes	

		s		a	a	s					navigation					
4	hhbb	f	yes	abcg	d	c	d	yes	Both	ad	yes	games	No	Yes, more information about exhibits	ac	Yes
3	idei	b	yes	acg	b	n/a	n/a	yes	Smart phone	a	yes	instagram, Facebook, camera	No	Yes, more information/games	ce	Yes
3	iic	f	yes	bcg	a	n/a	n/a	yes	Smart phone	d	yes	no	No	No	ce	No
9	iaacibi	g	yes	adg	a	n/a	n/a	n	n/a	n/a	n/a	n/a	n/a		c	Not Sure
3	jbl	g	no	n/a	n/a	n/a	n/a	yes	Smart phone	a	yes	clock, cameras, weather, evernote, scanner, train info, nature	no	Yes, here by yourself	bc	Yes
3	jjb	g	yes	a	b	c	d	yes	Tablet	a	yes	social/news article	No	More for children	ce	Yes
1	j	a	no	n/a	n/a	n/a	n/a	yes	Both	da	no	books and videos	no	Don't know because it is such a touch and feel place	e	Not Sure
2	hd	c	yes	acdgs	b	bd	d	yes	Both	a	yes	internet, mail, what's app	no	Don't know, listening to people nicer to give personal choice that changes rather than always being the same.	ae	Not Sure

4	hhaa	g	ye	abcd	c	ab	d	ye	Both	bd	yes	internet connectivity, publishing, web browser, being able to connect to the web and look things up, being able to publish and upload things	no		Some sort of augmented reality, interactivity with exhibits, a quest for the children to go on	ce	Yes
2	gg	b	ye	af	b			ye	Smart phone	c	yes	games	no		Yes, virtual tour, information about stuff	ce	yes
1	j	c	ye	a	c	n/	n/	ye	Smart phone	b	no	educational (for museums) and gps	yes	Historic Museum in Scotland- GPS capabilities to provide supplemental information based on where you are	yes more information	b	Yes