

Visitors, Museums, and Mobiles

Final Project Report

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Abstract

This project provided Museums Victoria with data on visitors' current uses of mobile devices in the Melbourne Museum and their interest in mobile technology, and gave recommendations for further integrating these devices. Through visitor observations and exit surveys, data showed that visitors were generally interested in engaging with technology and commonly used their devices to take pictures, especially of family members and the dinosaur exhibit. We recommended that the museum create an interactive digital map accessible via a mobile device, advertise the free Wi-Fi, and explore the implementation of an augmented reality photo booth and a scavenger hunt application. This study will allow Museums Victoria to further the development of mobile technology to enhance the visitor experience.

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Chapter 1: Introduction

Museums offer a way to protect and reveal history and artifacts of cultural significance through sharing stories and informative exhibitions. The presentation of history includes videos, infographics, artifacts, and reading material, in order to convey information to the museum guests. The goal of presenting a variety of exhibit formats is to allow visitors with various backgrounds and learning styles to engage, learn from, and enjoy their experiences in different ways. In order for museums around the world to retain their relevance while still preserving their vision, they must continuously meet the shifting culture and expectations of their visitors. As Johann Wolfgang von Goethe once said, museums should “never be finished, but boundless and ever in motion” (Russell, 1982).

Museums are constantly seeking new ways to leverage technological advances to improve the engagement of their exhibits. Mobile devices in particular have provided museums with new and innovative platforms to attract and captivate visitors throughout the museum experience (Goodin, 2006). For example, the American Museum of Natural History, in New York City, is utilizing Bluetooth technology to provide supplementary information through mobile devices to museum guests on self-guided tours. Similarly, virtual and augmented reality has been implemented at the Franklin Institute of Philadelphia and the Royal Ontario Museum, respectively, to offer immersive experiences within exhibits. New mediums for museum experiences such as these allows new and exciting ways to engage with exhibits.

Museums Victoria, Australia's largest public museum organization, is continually striving to improve their facilities and guest satisfaction, despite retaining a steady visitor attendance (Museums Victoria Annual Report 2015/16, 2016). One specific approach to upgrading their exhibits is through the use of mobile technology. Museums Victoria currently has two cell phone applications available for visitor use throughout the museum journey. Their Immigration Museum offers a multilingual tour application, which supplies guided tours in nine different languages with personalized stories based on the different exhibits throughout the tour. The second application offers users a guided walking tour of historical sites around Melbourne. *MV Tours: Walk Through History* uses the phone's global positioning system to bring people to several stops along each route. At each stop, the application provides reading material, audio commentary, and imagery that reveal the historical significance of the location. Although Museums Victoria used technologies in specific exhibits, the museum staff would like to better

understand visitors' current mobile device usage throughout the Melbourne Museum, and their expectations regarding technology in the exhibits, so they can implement features that capture visitors' interests, while not detracting from the educational value or visitor experience.

The goal of this project was to assess visitor interest and current use of mobile technology in the Melbourne Museum and present recommendations to Museums Victoria for the further development of mobile technology to enhance the visitor experience. To meet our goal, we identified the following objectives: 1. Establish a database of all current electronic device usage and visitor behavior in the Melbourne Museum; 2. Define the visitors' expectations and appeal of mobile technology for enhancing the visitor experience in museums; and 3. Evaluate visitors' initial responses and engagement with one upcoming museum exhibition.

Chapter 2: Literature Review

This chapter will present background information necessary for understanding the contextual elements of mobile educational practices in museums to provide useful recommendations to the Audience Insights staff of Museums Victoria. To begin, we introduce and describe Museums Victoria, including the Audience Insights team, and outline their missions and goals. We will analyze the global growth of mobile technology, particularly of smartphones and tablets. Next, we will address how museums are utilizing mobile device technologies by examining a variety of ground-breaking digital experiences that museums around the world are implementing to enhance the visitor engagement. Then, we will explain best practices for conducting museum research for profiling and analyzing museum visitors. Finally, we present two case studies, that provide models and methods to implementing technological experiences in museums and explain how they will inform our project.

2.1 Museums Victoria: Site Profile and Mission

The Museums Victoria organization was founded in 1854 as the National Museum of Victoria. The Industrial and Technological Museum of Victoria was added shortly thereafter to establish what is known today as Museums Victoria. Today, the corporation operates three different museums: the [Melbourne Museum](#) containing the Bunjilaka Aboriginal Cultural Centre, the [Immigration Museum](#) and the [Scienceworks](#) Museum. In addition, Museums Victoria also operates the Royal Exhibition building, the world's oldest exhibition pavilion, where events run by Museums Victoria are held, as well as other companies who rent out the space (Museums Victoria, 2017). All of these entities are located within the city of Melbourne relatively close to one another. Carlton Gardens, is home to the Melbourne Museum, the Bunjilaka Aboriginal Cultural Centre and the Royal Exhibition building. Scienceworks, and the Immigration Museum are both located off-site from Carlton Gardens.

The Museums Victoria vision states that it is “leading Museums that delight, inspire, connect and enrich” (Museums Victoria Annual Report 2015/2016, 2016). The organization upholds this vision, by striving to be active in the community where it resides. For example, the Museums Victoria Outreach Program is a local government initiative in which learning kits, containing school supplies and hands on learning materials, are distributed to local schools (Museums Victoria Strategic Plan, 2013). Museums Victoria utilizes their “knowledge,

collections, and expertise to build connections with and between individuals and communities to enhance understanding,” (Museums Victoria Strategic Plan, 2013, p. 3).

Museums Victoria is continually striving to “engage people in critical ideas and issues through new ways of communicating and connecting” by developing programs that meet the individual needs and preferences of the visitors (Museums Victoria Strategic Plan, 2013, p. 4). For example, their Autism Friendly Project helps parents of children with autism plan their visits to the museum to make the children as comfortable as possible in the museum. They provide a map of the museum that indicates the high and low sensory galleries so parents know which galleries will best suit their children (The autism friendly museum, 2017). This project won the 2015 Museums Australia Award for Large Museums (Museums Victoria Annual Report 2015/16, 2016). Museums Victoria is also working to improve their expertise, collections, and knowledge by incorporating new disciplines and interactive experiences. The Bunjilaka Cultural Centre, is recognized as an exceptional cultural destination “providing an important educational and hands-on experience for those wanting to learn more about Indigenous culture” (Borom, 2014). The variety of programs and interactive experiences allows a wide array of audiences to become engaged with the museum.

To further their commitment to visitor engagement, Museums Victoria has recently shown interest in utilizing mobile technology in their museums. They believe that “keeping up with the continually shifting digital environment requires organisations to be forward-looking and agile” (Museums Victoria Strategic Plan, 2013, p. 4). Currently, Museums Victoria has a limited number mobile device applications that visitors can access while exploring the museums. The Immigration Museum, for example, provides a Multilingual Tour application, enabling visitors to receive a guided tour in six different languages. In addition, the Scienceworks Museum has a long term exhibition called *Think Ahead*, which contains many interactive and technological features, concerning the future of technology. The technology used in the museums is the foundation for the opportunities that Museums Victoria wishes to further explore.

2.1.1 Stakeholders

The Museums Victoria staff, specifically our sponsor Carolyn Meehan, in the division of Audience Insights was the recipient of the project analysis, findings, and recommendations, which gave them evidence based insight into how they could modify their exhibits. The Audience Insights team works to conduct “visitor studies, marketing research, and audience evaluations of the exhibitions”, then produces reports and recommendations of their findings for the improvement of the museums (Meehan, *n.d*). The staff includes the administrative members of Museums Victoria along with the curators of the exhibitions. Both groups will work to decide the best way to interpret these findings and take the appropriate action. Any actions discussed must be sure to be aligned with the vision of Museums Victoria and be beneficial to all parties involved. Although the administrative staff will be making the executive decisions based on the project results, the curators will also have significant influence, as the curators are responsible for implementing exhibit modifications to introduce new mobile technology.

The visitors of Museums Victoria will provide the benchmark for current mobile device use and opinions for future implementation. Their input and opinions will shape any possible implementation of mobile device technology and provide feedback on similar experiences already in place at existing exhibits. Demographics of the visitors, as well as their expectations for the use of mobile technologies, will be recorded and will factor into the recommendations made to the Audience Insights staff of Museums Victoria.

2.2 Growth of Mobile Technology Globally

Mobile technology is continually expanding and increasing its capabilities for users all around the world. The use of smartphones has increased dramatically within just the last four years. In a study conducted by the Pew Research Center, in 2015, 37% of adults around the world reportedly own a smartphone, a significant growth in smartphone ownership compared to an average of 21% of adults who reported owning a smartphone in 2013. Among the United States, Canada, Israel, Western European nations and Pacific nations such as Australia, Japan and South Korea, the percentage of adults owning a smartphone rose to 68% in 2015 (Poushter, 2016). Figure 1 below displays the percentage of adults who report owning a smartphone, by country. As shown in this figure, in more developed nations, the percentages are relatively high

and above the global median. Museums around the world are noticing this rise, and are seeking ways to take advantage of it, and implement new technologies into their facilities.

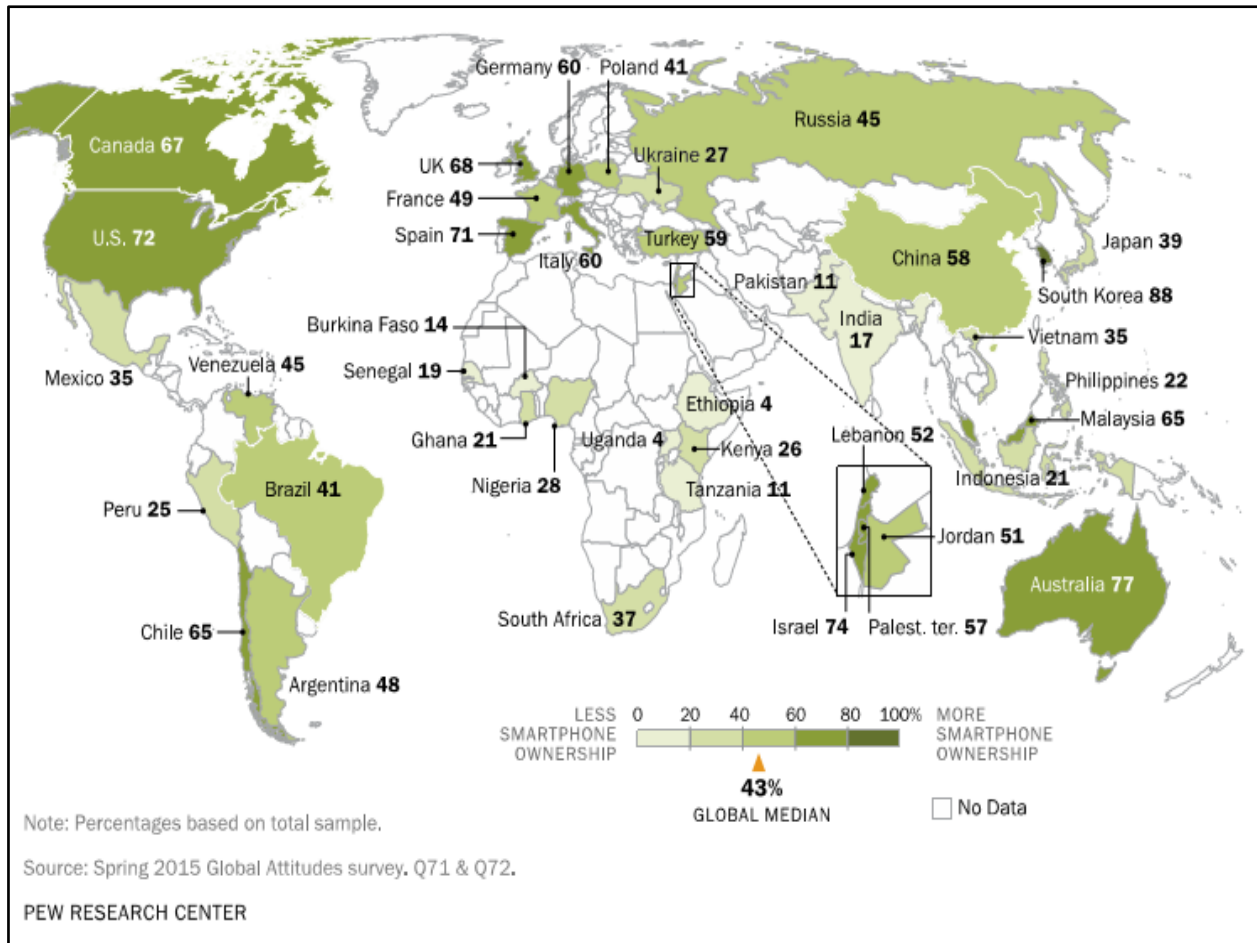


Figure 1: Percent of Adults Who Own a Smartphone, by Country (Pew Research Center, 2016)

Within the population of adults owning smartphones globally, millennials (ages 18-34) are statistically more likely to have a smartphone compared to those ages thirty-five and older. For example, 85% of French millennials report owning a smartphone, while only 35% of French adults (ages thirty-five and over) report owning one. This can be attributed to the greater appeal and use of social media for this younger generation (Poushter, 2016).

In addition to smartphones, the use of tablets has also increased around the world within the last seven years. Specifically, in the United States, the percentage of adults owning a tablet computer rose from around 5% in 2010 to nearly 50% in 2016, as shown in Figure 2 below.

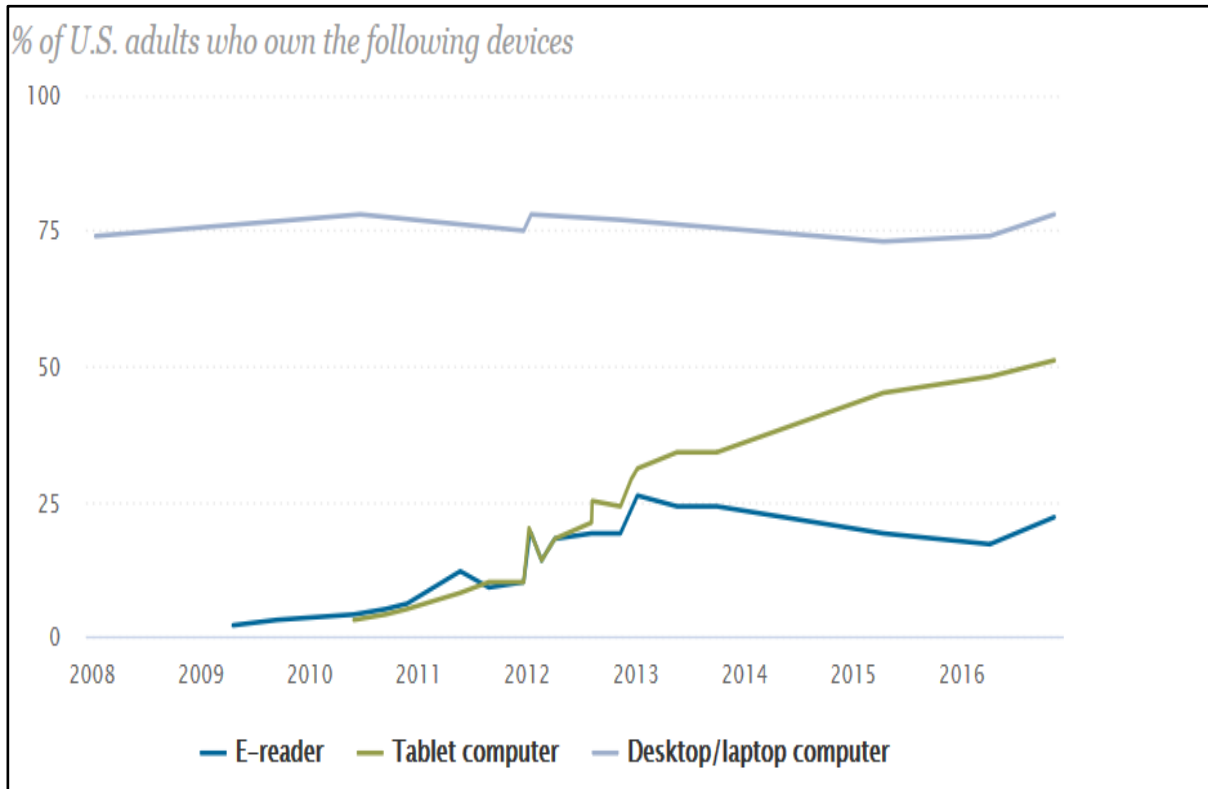


Figure 2: Percent of Adults in the U.S. Owning Specific Devices (Mobile Fact Sheet, 2016)

The growth in smartphone and other mobile device usage over the last decade is clearly attributed to the fact that mobile devices are not just for calling and texting (Rainie & Perrin, 2017). Smartphones can make life easier and more manageable with the ability to accomplish daily tasks that were once done on the computer, in person, or on paper. These devices have enabled a variety of responsibilities, including but not limited to, working, job searching, reading a book and other educational content to be completed using a handheld device. According to a Pew Research Study, 46% of smartphone owners say “they couldn’t live without” their smartphone (Rainie & Perrin, 2017).

2.2.1 Growth Of Mobile Device Usage in Australia

In Australia, “mobile consumption and usage have never been higher” (Farman, 2015). Figure 1 in Chapter 2.2, shows that percentages of adults in Australia that report owning a smartphone is 77%, 35% above the global median, and a bit above of some industrialized nations as well. The use of mobile devices, specifically smartphones and tablets, has been increasing steadily since 2014. As shown below in Figure 3, the number of Australians, aged 14 and over, that own smartphones and tablets in 2013 compared to 2015 rose from 11.1 million to 15.3 million and 6.3 million to 11.2 million, respectively.

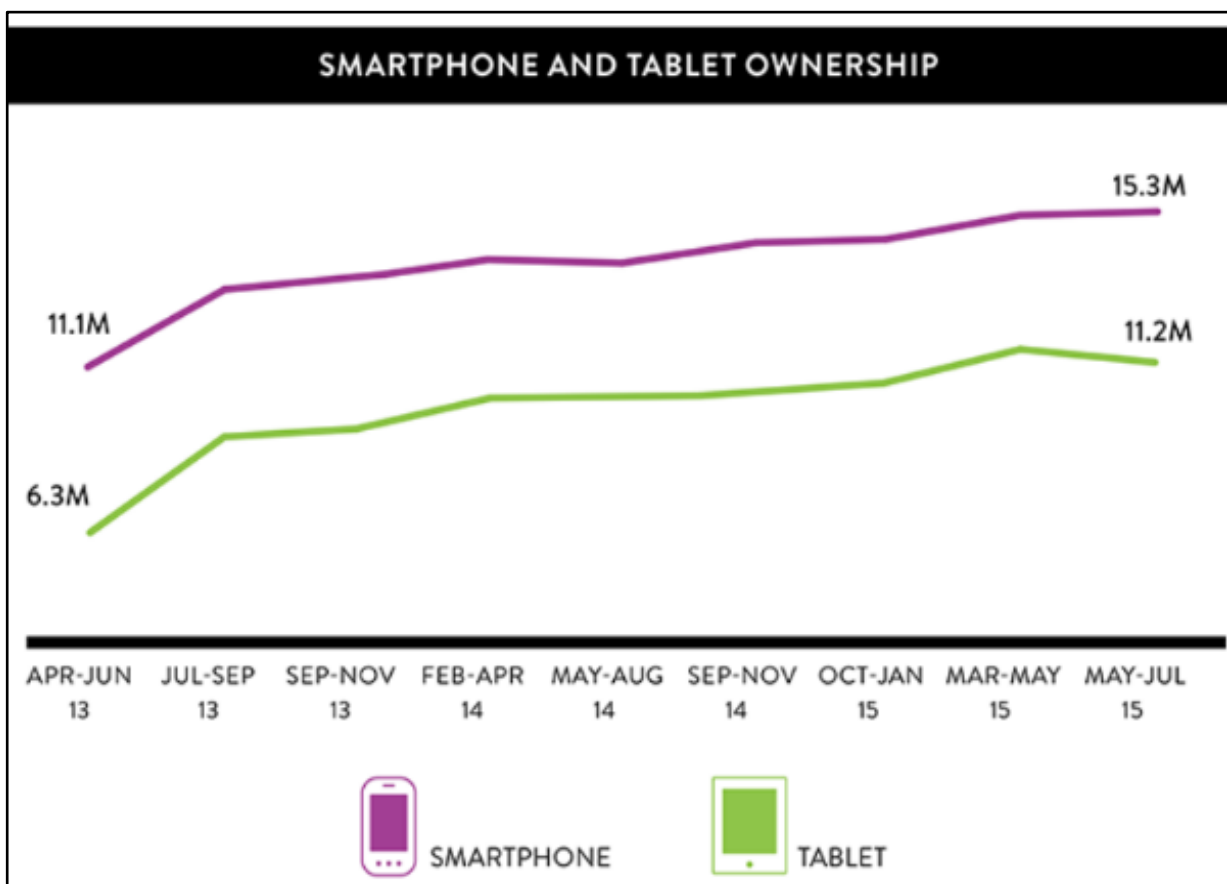


Figure 3: Australian Smartphone and Tablet Ownership (Farman, 2015)

In addition to the increase in the number of smartphones and tablets, Australians, aged 18 and up spend more time on the tablets and smartphones than on their desktop computers. According to this survey completed by the Interactive Advertising Bureau (IAB), September 2015 was the first month where the time spent on smartphones and tablets was greater than that

of PCs. On average, respondents reported that they spent 35 hours per month on smartphones, compared to 26 hours per month spent on tablet devices (Farman, 2015). The increasing use and ownership of smartphones in Australia makes them ideal for usage in many settings, including museums, to engage and attract visitors.

2.3 Mobile Technology in Museum Settings

An increasingly common form of learning, called informal learning, is generally a voluntary activity, taking place outside of the classroom. Attending museums, zoos, and libraries all fall into the scope of informal learning (Gikas & Grant, 2013). Informal learners like to take the initiative to learn new things when they do not necessarily have to. Sometimes called autodidacts or self-directed learners, informal learners possess a continuous feeling that they need to achieve something to either better themselves or the world around them (Heath, *n.d.*). This study will specifically focus on the ways in which mobile technology can enhance the process of informal learning in museums.

Museum organizations recognize that the use of smartphones by their visitors is not only inevitable, but provides an opportunity to use technology to enhance interest and informal learning. (Gilbert, 2016). In traditional museum settings, visitors walk through exhibits, read signs and infographics and admire historical artifacts. With access to new and expanding digital experiences, museum now have ways to provide a variety of ways to explore and experience exhibits (Illytzky, 2016).

As seen in Figure 4 below, museums' primary goal from using mobile devices is to increase visitor engagement. Technology has the potential to offer captivating learning experiences that cannot easily be replicated in a formal learning setting, such as a classroom. The following section describes some of these captivating learning experiences in greater detail. The second goal, meeting visitor demand for mobile technology, allows museums to engage their guests and retain their interest. A primary goal of the Audience Insights team was to understand exactly what interests the museum visitors. They were focused on knowing the visitors' expectations and the appeal relating to various mobile technologies. Although the results in Figure 4 were from a survey conducted in the United States, the results are applicable to Australians because the proportion of Americans who report owning smartphones is the same as in Australia (Mobile Fact Sheet, 2017). Museums Victoria was interested in exploring the

different opportunities to bridge the gap between their museums and their audiences, while continuing to attract new and frequent visitors.



Figure 4: Goals for Mobile Programs in Museums (Mobile in Museums Study, 2012)

2.3.1 Mobile-based Interactive Platforms in Museums

Many different technologies are being implemented in museums around the world that enhance the visitor experience. Figure 5 shows the top mobile technologies used in museums around the United States. The most popular technology that museums are using is the Quick Response, or QR, code. Figure 6 is a visual of what a QR code looks like.



Figure 5: Top US Museum Mobile Offerings (Mobile in Museums Study, 2012)



Figure 6: Quick Response (QR) Code (qr-code-generator, nd)

To use a QR code, the user must have a QR code reader on their mobile device, either built into their camera, or downloaded separately with a QR code reader application. Once the QR code is scanned using the application, the user may be presented with a range of resources, such as articles, videos, audio tracks, games, or reviews from other visitors (Medić & Pavlović, 2014). The use of QR codes presents many advantages for museum organizations in part because the codes are free to produce and use, which avoids the need to increase visitor costs. In addition, the versatility of QR codes is appealing to museum curators because it provides a way for a museum to help visitors select which exhibits they would like to learn more about, and gives them the opportunity to allow their visitors to interact with other members of the community.

Recent technological developments for visitors are also trending toward augmented reality. The Royal Ontario Museum in Canada, for example, has a smartphone application that uses a scanner to project flesh and skin onto the bones of dinosaurs to appear life-like to the viewer (Gilbert, 2016). Figure 7 below is a photograph of the augmented reality feature that visitors can experience. The dinosaur on the screen has skin projected onto the real dinosaur bones that are displayed in the exhibit.



Figure 7: Augmented Reality in Royal Ontario Museum (Rieland, 2012)

The Assistant Vice President of Marketing at the museum, Tracy Ruddell, states that “Technology has changed the way people consume information. There is a huge opportunity for educational providers like the ROM [Royal Ontario Museum] to harness the power of new technologies, like Augmented Reality, to engage with visitors on a deeper, more personal level” (Royal Ontario Museum, *n.d.*).

Another augmented reality experience can be found in the [Nobbies Center](#) on Phillip Island in Victoria, Australia. Located in the Antarctic Journey experience, visitors are projected onto the wall alongside computer generated Antarctic marine life. It appears as if the visitors are standing on an iceberg, while animals move around and jump onto the ice platform. Figure 8 below is a picture of visitors interacting with animated penguins in the experience.



Figure 8: Augmented Reality Experience on Phillip Island

Along with augmented reality, virtual reality has become popular in museum settings. The Smithsonian’s new National Museum of African American History and Culture has been utilizing virtual reality, which enables visitors to feel like they are actually experiencing the exhibit. The goal of virtual reality, according to Lonnie Bunch, the museum director, is to

“humanize history” (Gilbert, 2016). The Franklin Institute of Philadelphia is also offering a virtual reality experience to “transport” their museum visitors to new places, such as a space shuttle or the nuclear disaster site in Chernobyl (Illytzyk, 2016). A picture of this experience at the Franklin Institute of Philadelphia can be seen in Figure 9. In virtual reality, a participant can embrace the experience, as opposed to merely looking at a photograph or statue, and can learn about a variety of topics, such as physics and the geosciences (Lee & Fung, 2010).



Figure 9: Virtual Reality Experience at The Franklin Institute of Philadelphia (Burdo, 2016)

Museums are also implementing technologies that offer a way for new material to be sent directly to the screen of the visitor’s mobile device. Recent advances in Bluetooth technology, called beacons, provide a mechanism for museums to track the movement of their visitors and locate visitors when they arrive at a new exhibit or gallery. The corresponding cell phone application that employs and interprets the beacon signs can, ideally simultaneously feed a visitor new information through reading material, audio tapes and videos. “The beacons amplify the experience,” claims Brendan Ciecko, founder of [Cuseum](#), a Boston start-up that is testing beacons in museums around the United States. At the American Museum of Natural History in

New York City, this technology allows visitors to opt in or out of information, so they don't feel overwhelmed and can gain as much insight as they would like. In addition, users of this cell phone application can post their own reviews and reactions of the exhibit for others to read. This allows for a large transition from curators providing all the information, to gaining another perspective of the exhibit from other visitors (Michael Cannell, 2015) This method of delivering new information displays how museums are taking the increased use of networking and interaction through cell phones into their museums. Elizabeth E. Barker, director of the Boston Athenaeum, feels strongly that "beacons aren't a life raft, but a bridge to the next generation of museum users" (Cannell, 2015).

2.4 Analyzing Visitors Through Museum Studies

In order to present Museums Victoria with useful recommendations on how to improve the museum experience through mobile technology, we intend to analyze the visitors. A portion of this project will evaluate the baseline for visitor use of mobile technologies in Museums Victoria. Key methods for evaluating visitors include visitor surveys and individual interviews. In the next section we explore some of the relevant strategies that can be used to evaluate visitors in museum settings.

2.4.1 Methods of Collecting Data

Conducting surveys is a form of data collection which is used to learn about trends, characteristics, opinions, or attitudes (Brewer, 2009). When conducting a study through surveys, we identified a method known as a cross-sectional survey. Cross-sectional studies involve a survey being given to one or multiple population samples on one occasion. Due to the data being collected in only one instance, this method of research is not appropriate for in-depth studies which analyze progressions of trends over time (Brewer, 2009). Choosing when to survey respondents is also an important factor to ensure we are collecting the best data possible. In an exit intercept survey, participants are stopped prior to their departure and asked to answer a few questions. It is important that the surveyors request as little of their time as possible, to keep participants from getting agitated while providing valuable data (Yocco, 2016).

Another method of evaluating visitors is through interviews, which can be conducted using a structured format. In a structured interview, predetermined questions are used to prevent

the interviewer from straying from the conversation (Wilson, 2012). The interviewer is able to keep the focus on the specific questions that they asked the respondent.

The final data collection strategy is visitor observation. An observation technique, known as tracking-and-timing (T&T), looks at the behaviors of the visitors (Serrell, 2010). A few examples of recorded behaviors include reading specific information in an exhibit, participating in an interactive display, or watching a video. Doing so can demonstrate how engaged visitors are at a specific exhibit.

Convenience sampling is one method that can be used to collect survey and interview respondents, as well as visitors to observe. This strategy involves collecting data from the easiest sources available, allowing for direct communication between the surveyor and respondents or interviewee, and improved data quality (Ward, 2013, p. 76).

2.5 Case Studies in Museum Engagement

To gain a better understanding of conducting a museum study through observing and surveying museum visitors, we analyzed two case studies: one from the Indianapolis Museum of Art, and the second from the Cooper Hewitt Smithsonian Design Museum. Some highlights that can inform our study are described in greater detail below.

Case study 1: The Indianapolis Museum of Art

In 2014, the Indianapolis Museum of Art (IMA) began “a significant shift toward becoming a more visitor-centric institution” (Sternbergh, Fantoni, & Djen, 2015). To fulfill this mission, the IMA’s management requested that the exhibitions be more engaging and accessible to the museum visitors than they were in the past. One of the major initiatives of becoming visitor-centric was the development of an iPad application that would engage the visitors with the artworks. The application, called *Pointillize Yourself*, enables visitors to take a “selfie,” apply filters, and add colored dots and a caption. The user can then choose to save the photo and share it via email or Facebook. The pictures were then projected on a wall outside the exhibit, where many visitors were observed waiting for their pictures to appear (Sternbergh, Fantoni, & Djen, 2015).

The Indianapolis Museum of Art surveyed over 750 visitors and interviewed 30 participants on their experiences with *Pointillize Yourself*. The mobile application was a big

success, according to the IMA's data managed by Google Analytics. Over the course of the experiment, about 13,000 photos were taken, of which about 9,000 were shared. The survey results indicate that 61% of visitors decided to use the app, making it the most successful interactive feature IMA has ever created. "Overwhelmingly, visitors described the experience as 'fun,' 'easy,' and 'not overdone'" (Sternbergh, Fantoni, & Djen, 2015). One noteworthy pattern found via data analytics was that even though the application was not intended for educational use, 34 people reported having learned something from their digital experience. For example, people mentioned that they learned about color theory and how colors can be blended (Sternbergh, Fantoni, & Djen, 2015).

The intentions, processes, and outcomes of this case study are directly applicable to the project proposed by Museums Victoria. Like Museums Victoria, the IMA wanted to implement technological solutions to enhance the user experience at its exhibits. The process of developing this case study and the museums' focus on visitor-centricity will be helpful when developing the methods for this IQP.

Case study 2: Cooper Hewitt Museum

The Cooper Hewitt Smithsonian Design Museum located in New York, reopened in 2014 with a new range of interactive capabilities. The newly developed technological Pen provided a way for museum visitors to interact with, and personalize the collections of the museum. Visitors are able to use the Pen to scan and collect objects from the galleries and use interactive tables to create their own designs, which can be shared online or stored for later use during return visits.

Upon entry to the museum, the Pen is distributed to every guest who desires it. During a six month data collection period, the Pen was distributed 62,015 times, which was 94% of total visitors of the museum (Murphy, 2015). The museum experienced a multitude of original creations from visitors who shared their creations on social media. Sebastian Chan, the Director of Digital & Emerging Media at the Cooper Hewitt Museum, commented on the involvement and infatuation with the Pen, saying, "a simple look at Instagram makes it very clear that visitors love the interactivity [of The Pen] and the ability to 'put themselves into the museum'" (Murphy, 2015). When each visitor leaves the museum, they are given a URL to access their collections. The percentage of users who viewed their work at a later time dropped 5% after the first four

months, motivating museum staff to remind guests to view their collections online when they leave the museum (Murphy, 2015).

The model provided by the Cooper Hewitt museum is a valuable demonstration for utilizing new and innovative technologies in museums. Their visitor satisfaction was analyzed, reevaluated, and then used to improve visitor experience. The museum was able satisfy their goal of promoting interactive visitor engagement (Murphy, 2015).

2.6 Summary

Museums Victoria would like to identify new technological ways in which they can engage their visitors. Using technology to supplement exhibits could allow Museums Victoria to stay relevant in today's technologically advancing world and deepen the learner's engagement in the exhibits. Numerous museums around the world have already implemented exhibits involving mobile technology and are noticing an increase in attendance. The literature review outlined the extensive research conducted by the WPI team on mobile technology and methods of conducting museum studies. This research helped the team develop the focus of the study.

Chapter 3: Methodology

The goal of this project was to assess visitor interest and current use of mobile technology in the Melbourne Museum and present recommendations to Museums Victoria for the further development of mobile technology to enhance the visitor experience. To achieve this goal we identified three specific objectives:

1. Establish a database of current electronic device usage and visitor behavior in the Melbourne Museum
2. Define expectations and appeal of mobile technology for enhancing the visitor experience in museums.
3. Evaluate visitors' initial responses and engagement with one upcoming museum exhibition.

3.1 Establish a database of all current electronic device usage and visitor behavior in the Melbourne Museum

Museums Victoria is interested in what mobile technologies their visitors are currently utilizing while exploring the Melbourne Museum exhibits. To address this interest, we will use a combination of surveys and visitor observation. This will allow us to establish a baseline of visitor engagement mechanisms and mobile device usage throughout the museum.

3.1.1 Surveying of Museum Visitors

We used convenience sampling to conduct exit surveys on visitors upon their departure of the Melbourne Museum. Museums Victoria provided us with multiple tablets to conduct the survey. SurveyGizmo, an online survey platform already used by Museums Victoria, was used to create and administer our survey. We asked respondents questions from the survey and recorded their answers in SurveyGizmo. Before we began collecting data, we piloted the survey on ten museum visitors and Professors Oates, to ensure the questions were clear and easy to understand (Ward, 2013, p. 75).

The initial survey question asked whether or not the visitors owned a mobile device, which immediately divided our sample population into two groups: those with a mobile device and those without. If the respondents owned a mobile device, we asked whether or not they brought it to the museum. If they did not own one, we asked a few follow-up questions about

their thoughts on owning mobile devices. If the respondents owned a mobile device and had it with them during their visit, we asked about their use of the mobile device throughout the museum. For example, did they take pictures of the exhibitions, research additional exhibit information online, or post about the museum on social media? We also collected demographic data on this survey, such as gender and age, to inform us if there is an apparent trend relating mobile device usage to a certain group of our sample. A flow chart of the survey can be found in Appendix A.

After collecting data from 150 exit surveys, the responses were exported from SurveyGizmo to Microsoft Excel and then coded using a specific method used by Museums Victoria and demonstrated to us by the Audience Insight team. Next, a statistical analysis software, known as SPSS, was used to analyze and evaluate the data. The Audience Insight team also provided us with a template to use when creating a data summary document. This template is simply a word document that the Audience Insight team created, which displays the quantitative survey data, as well as some analysis and discussion. This data summary document also served as a deliverable of our project.

3.1.2 Observing Behavior of Museum Visitors

To better understand the mobile device usage of Museums Victoria visitors, we observed visitor behavior as they explored the museum spaces. We created a short survey using SurveyGizmo in which we recorded information, such as gender, approximate age, and the gallery in which the visitor was using the mobile device. Determining which exhibits provoked the most mobile device usage allowed Museums Victoria to find which exhibits could potentially benefit from new mobile technologies. We also took note of the density of visitors in each gallery in which we observed device use. We classified each gallery into one of three sizes (small, medium, or large) based on the physical size of the exhibition space. Due to this classification, the density categories (low, medium, and high) are different for each exhibit. The survey included a comments section to record any relevant information not captured by the standard survey questions, such as what visitors took photos of, or if they were part of a school group. The observation survey and a breakdown of the gallery size classifications can be found in Appendix C. Each member of the team split up and walked through each gallery of the museum, looking for people using their mobile devices. In order to ensure that we observed

guests in each gallery a comparable number of times, we systematically visited each gallery exactly once per pass through the museum. Using convenience sampling, we selected and observed museum visitors that were using their mobile devices, allowing us to easily gather several subjects in the time allotted (Dudovskiy, 2017).

3.2 Define expectations and appeal of mobile technology for enhancing the visitor experience in museums

In order to make informed recommendations to the sponsor for new ways to engage visitors at exhibits, it was important for us to conduct background research on Museums Victoria's current use of technology throughout their exhibits, as well as innovative technologies used around the world at various museums. Site visits to Museums Victoria institutions were combined with the extensive research documented in the literature review chapter to ensure that both the team and sponsor were aware of the technology visitors expected to see and why it is appealing to them.

3.2.1 Site Visits

To add to our understanding of the various ways technology is currently in museums, we conducted four site visits, one in Worcester and three in Australia. We visited the [Worcester Art Museum](#) prior to our departure, in order to identify the pros and cons of the mobile technology used there. Upon arrival in Melbourne, we conducted similar analysis when we visited all three of the Museums Victoria locations: the Melbourne Museum, the Immigration Museum, and Scienceworks. During our visits, we interacted with the technological interfaces provided for enhancing exhibits and noted key aspects of the experiences with which we felt most engaged. Through these visits, we gained insight and ideas that factored into our recommendations to Museums Victoria. Our findings from these site visits can be found in the Results and Discussions chapter.

3.2.2 Exhibit Interest Rating Exercise

An important part of our research was finding out specifically what applications of technology visitors found interesting. In order to achieve this goal, we compiled a list of various museum experiences involving mobile devices discussed in the literature review with the mobile

features we found in our site visits. We incorporated an interest rating exercise into our survey to gain a better understanding of which technologies appealed to visitors, by having them rate their level of interest in each of these exhibits. This exercise can be found in Appendix B. Finally, we shared the collected data from the interest rating exercise with the museum staff to make them aware of what interested the surveyed visitors the most.

3.3 Evaluate visitors' initial responses and engagement with one upcoming museum exhibition

Museums Victoria uses temporary exhibits to pilot new ideas and ensure guests have new experiences when they visit. Museums Victoria opened a new exhibit shortly after our time in Australia, that made use of mobile devices to enhance exhibit experience, called the *Inside Out* exhibit. We were able to experience and analyze the pilot testing of this new experience to fulfill the third objective of our project.

3.3.1 Inside Out Exhibit Audio Tour

Displayed in the Melbourne Museum, the *Inside Out* exhibit is meant to give the visitor a new perspective on history using items in the museum's collection told in a theatrical audio tour. The objects are reimagined and the experience is meant to immerse participants in stories about various topics such as historical events or artifacts (Museums Victoria, 2017). The exhibit was intended to target visitors in their early 20s and was set to be unveiled to the public on December 23rd. Due to the fact that the exhibition was opened after we left Melbourne, our role involved preliminary testing for the exhibition. The exhibition staging had not yet taken place, therefore we had to imagine how each display would appear. We experienced the audio tour ourselves, along with other WPI students, and our faculty advisors. The Audience Insights staff developed a list of questions to gather information on the appeal of the staged exhibits. An analysis of these group discussions can be found in the results and discussion chapter. The goal of this activity was to provide Museums Victoria with our reactions on using mobile technology in this manner, and give insight on any suggestions that could be made to the exhibit before it was opened to the public.

Chapter 4: Results and Discussion

This chapter presents the results of our three objectives to achieve our goal to assess visitor interest and the current use of mobile technology in the Melbourne Museum and present recommendations to Museums Victoria for the further development of mobile technology to enhance visitor experience.

4.1 Establish a database of current electronic device usage and visitor behavior in the Melbourne Museum

To establish the database of current electronic device usage and visitor behavior in the Melbourne Museum, we gathered data by conducting exit surveys with museum visitors and observed the behavior of visitors using mobile devices in the Melbourne Museum.

4.1.1 Results from Surveying Museum Visitors

We conducted 150 exit surveys outside of the museum gift shop to understand how people used their mobile devices during their time at the museum, or if they used their devices at all. Of the 150 people we surveyed, 148 of them reported owning at least one mobile device, and of those 148, 144 of them brought at least one device to the museum. We asked the four people who did not bring their devices to the museum if they thought having their devices with them would have added to their visit in any way, and all four of them said no. Also, visitors who responded in our survey that they were 60 years or older made up only about 20% of the total respondents, but accounted for about 45% of those who did not use their devices. 70% of people ages 60 or higher either did not own a device or had one and chose not to use it. Chart 1 shows the percentage of respondents from each age group who did not use a mobile device in the museum.

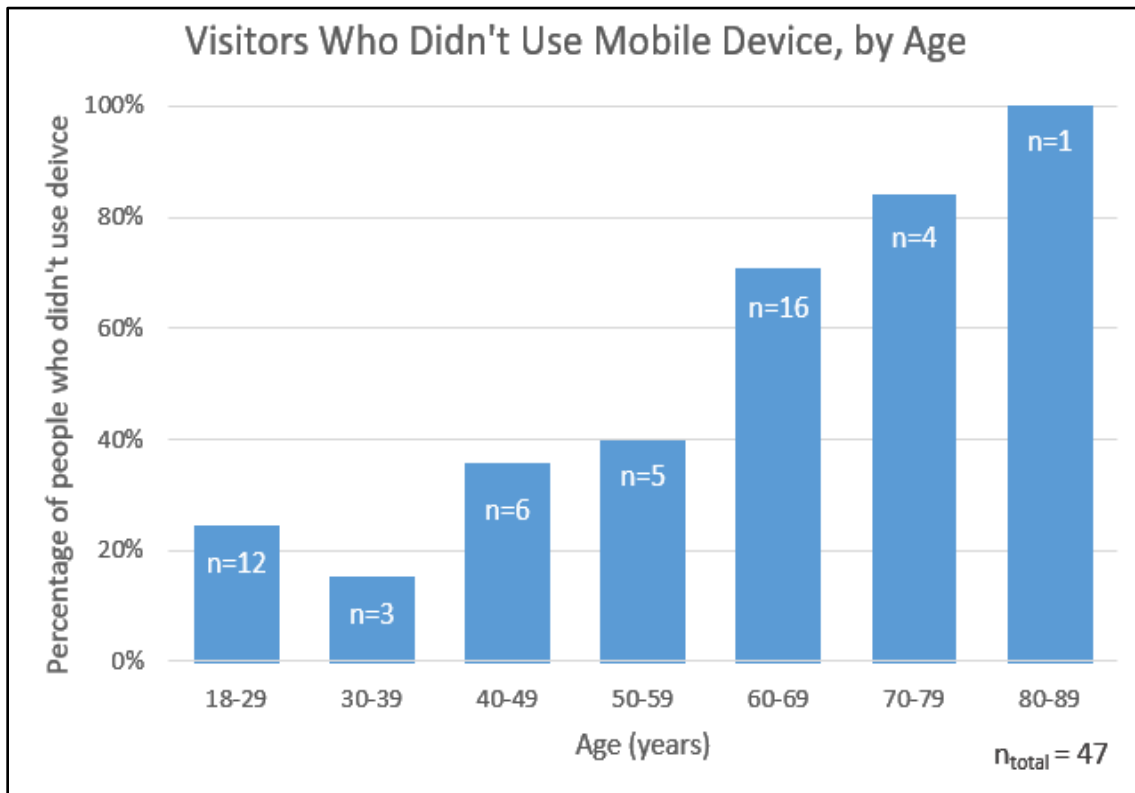


Chart 1: Percent of People in Each Age Group Who Did Not Use a Mobile Device

Out of the 144 respondents who brought their mobile devices to the museum, 102 people said they used their device throughout their visit, with about two-thirds using an iPhone and roughly one-third using an Android phone. Interestingly, only 65 of those 102 people who used their devices said they expected to use them when they arrived at the museum. The top nine reported device uses from the survey can be found in Chart 2 below. The top two results were taking pictures and text messaging, with 68.6% and 35.3%, respectively, of total respondents who reported using their phone. All other reported activities were categorized as the “other” section, making up about 13.8% of our recorded data. No single activity in the “other” category represents more than 3.9% of the responses.

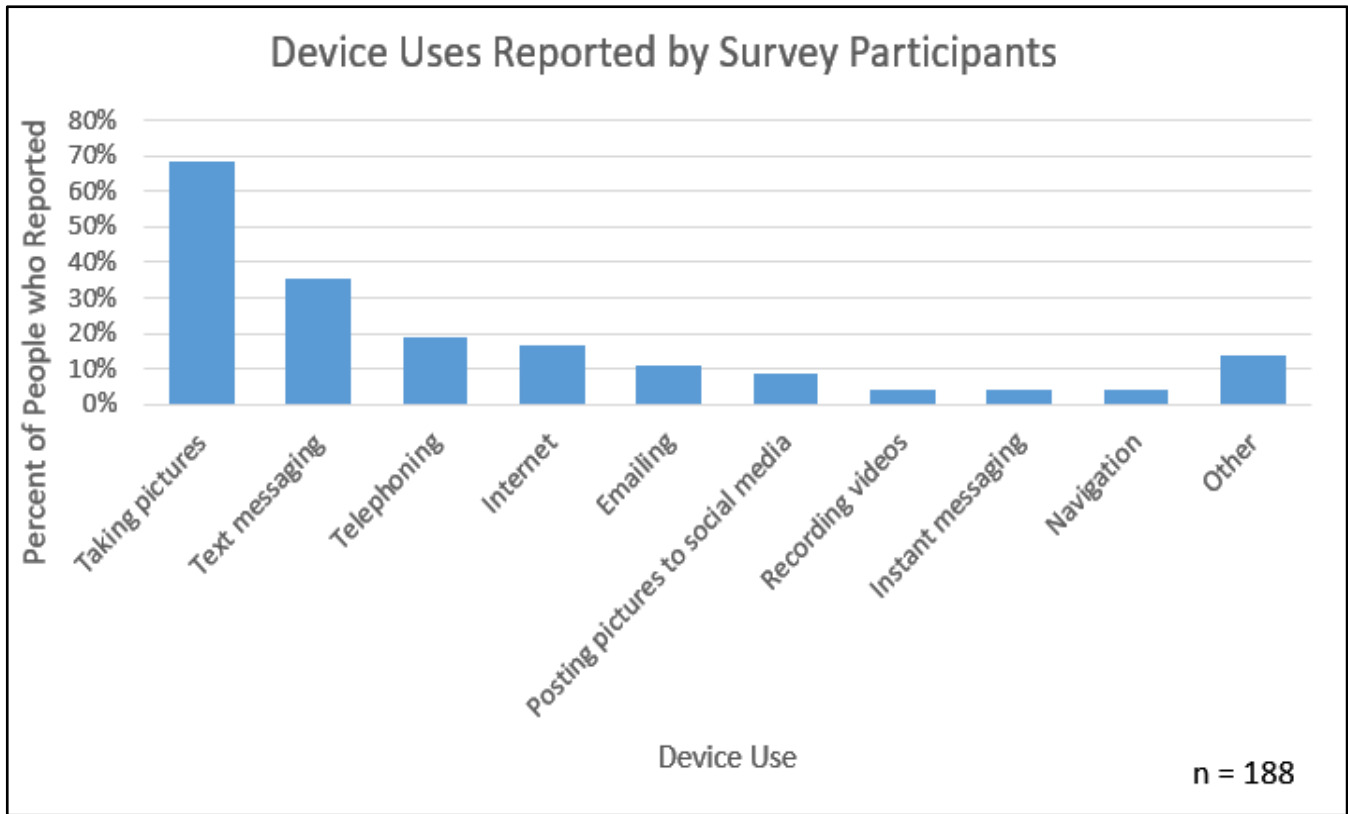


Chart 2: Mobile Device Uses from Survey

We asked those who used their devices if they thought it enhanced their visit in any way, and the responses were divided between thinking it added to their visit and thinking it did not, 51% of these visitors said that their device use added to their visit. If respondents reported that using their devices added to their visit in any way, we then asked them how they felt their experience was enhanced. For these individuals, 30 (n=52) responded that taking pictures allowed them to keep memories of the museum so they could look back and reflect on them later. 11 people said they enjoyed sharing their museum experience with others, either by sending them pictures or through other communications using their smartphones, such as text messages or emails. The data summary report of our survey results provided to Museums Victoria can be found in Appendix I.

4.1.2 Results from Observing Behavior of Museum Visitors

We collected data from 203 visitor observations, which took place in all galleries of the Melbourne Museum. Each team member walked around an exhibit, and with an iPad or

smartphone and completed an online form when a visitor was seen using a mobile device. Through visitor observation, we were able to record what the visitors were doing on their mobile devices, the approximate age distribution of visitors using the devices, and which galleries provoked the most mobile device usage.

Museums Victoria was primarily interested in what visitors were doing with their mobile devices while exploring the different exhibits in the Melbourne Museum. Chart 3 shows the various reasons people were using their mobile devices. Only the top 8 mobile device uses are individually displayed in Figure 8, making up 88% of the total observations. The “other” category in this chart represents the uses of mobile devices that make up the other 12% of responses, with no single reason being more than 1.8%. The data shows that 47% of the total observed mobile device use was taking pictures. This value is approximately 3 times the second most frequent reason, which was text messaging at 15% of the total observations.

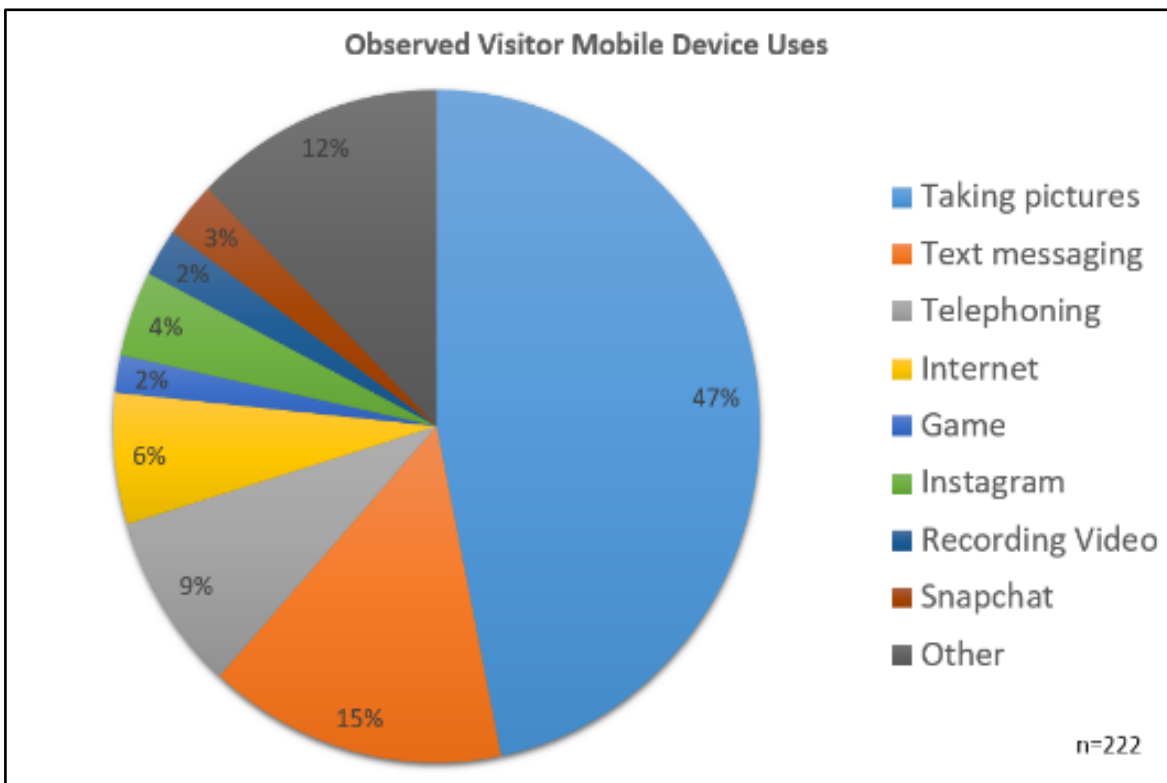


Chart 3: Mobile Device Uses from Visitor Observations

For those visitors taking a photograph, we recorded whom or what was captured by the picture. Chart 4 indicates what the visitors were capturing, with a corresponding frequency for each subject. The three most commonly photographed objects were family members, the dinosaurs in the Science and Life gallery, and the animals in the Evolution gallery with frequencies of 26, 24 and 17, respectively.

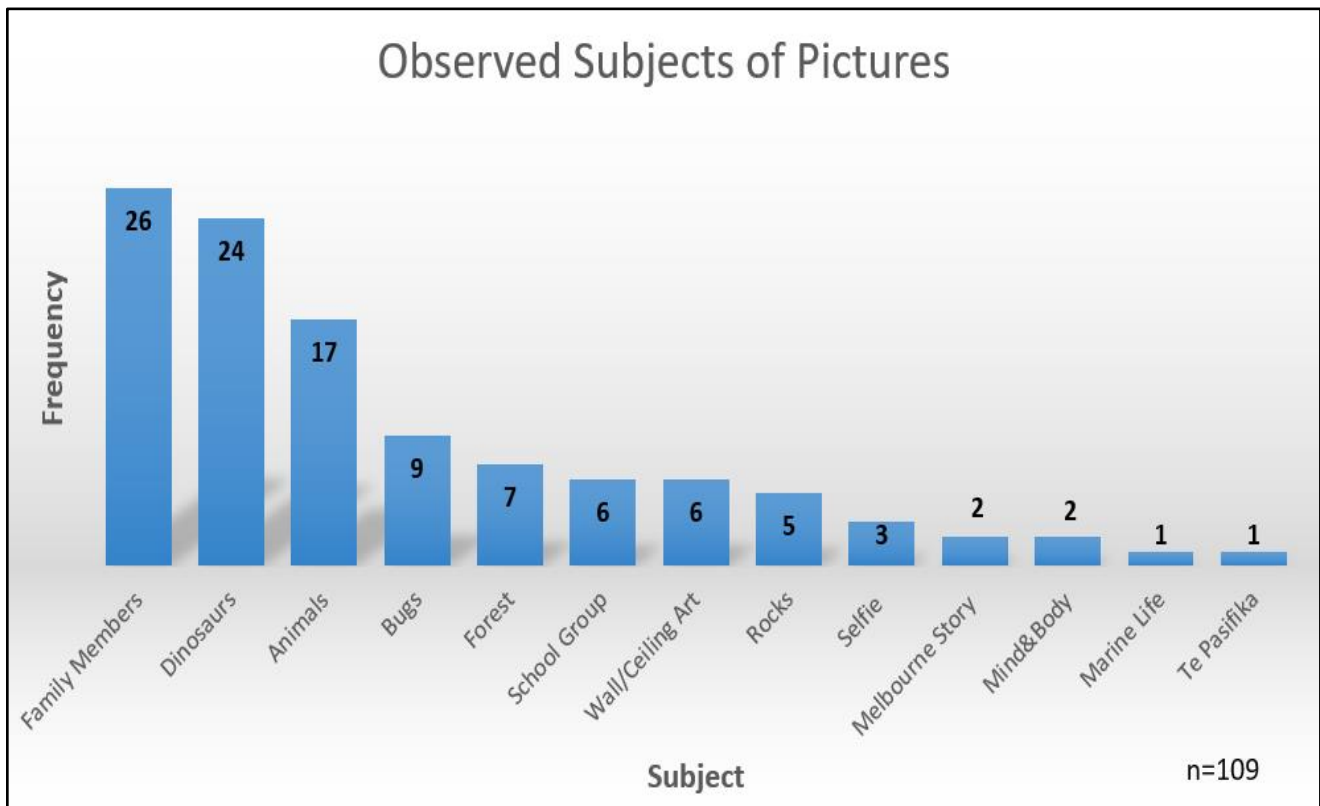


Chart 4: Subjects in Pictures of Observed Visitors

The name of the gallery as well as the gallery visitor density were recorded when the mobile device was being used. Chart 5 displays the distribution of galleries that visitors were using their mobile devices in. The dinosaur exhibit was most popular for mobile device use, accounting for about 24% of the total observations. The foyer of the museum and the children's gallery each had the second highest percentage with about 13%.

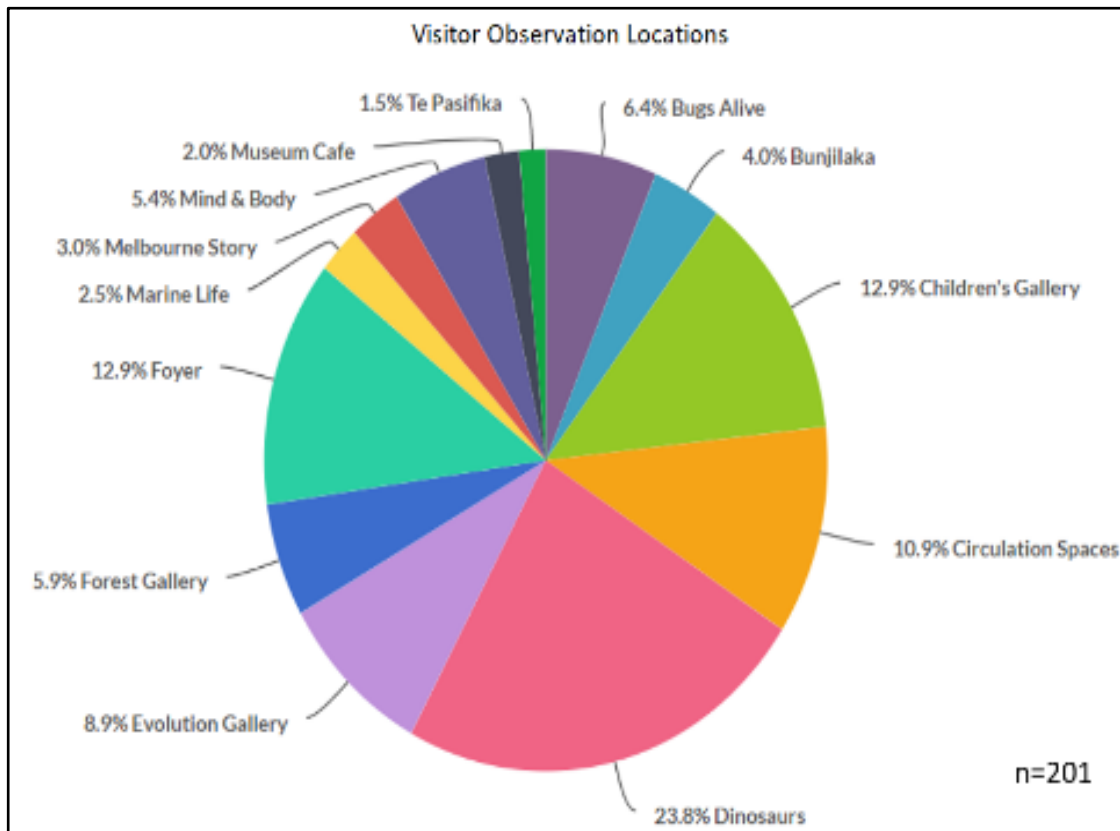


Chart 5: Observed Visitor Mobile Device Usage, by Gallery

A heat map displaying the galleries in which visitor observations took place can be found in Figure 10. The location of device use inside the galleries is accurate, however, because the foyer and circulation spaces are less specific to the exact location of the observed mobile device use, they are generalized on the heat map with one point for each. The foyer's representative point is on the ground level in the middle by the entrance and circulation spaces are represented on the upper level in the middle overlooking the Forest gallery.

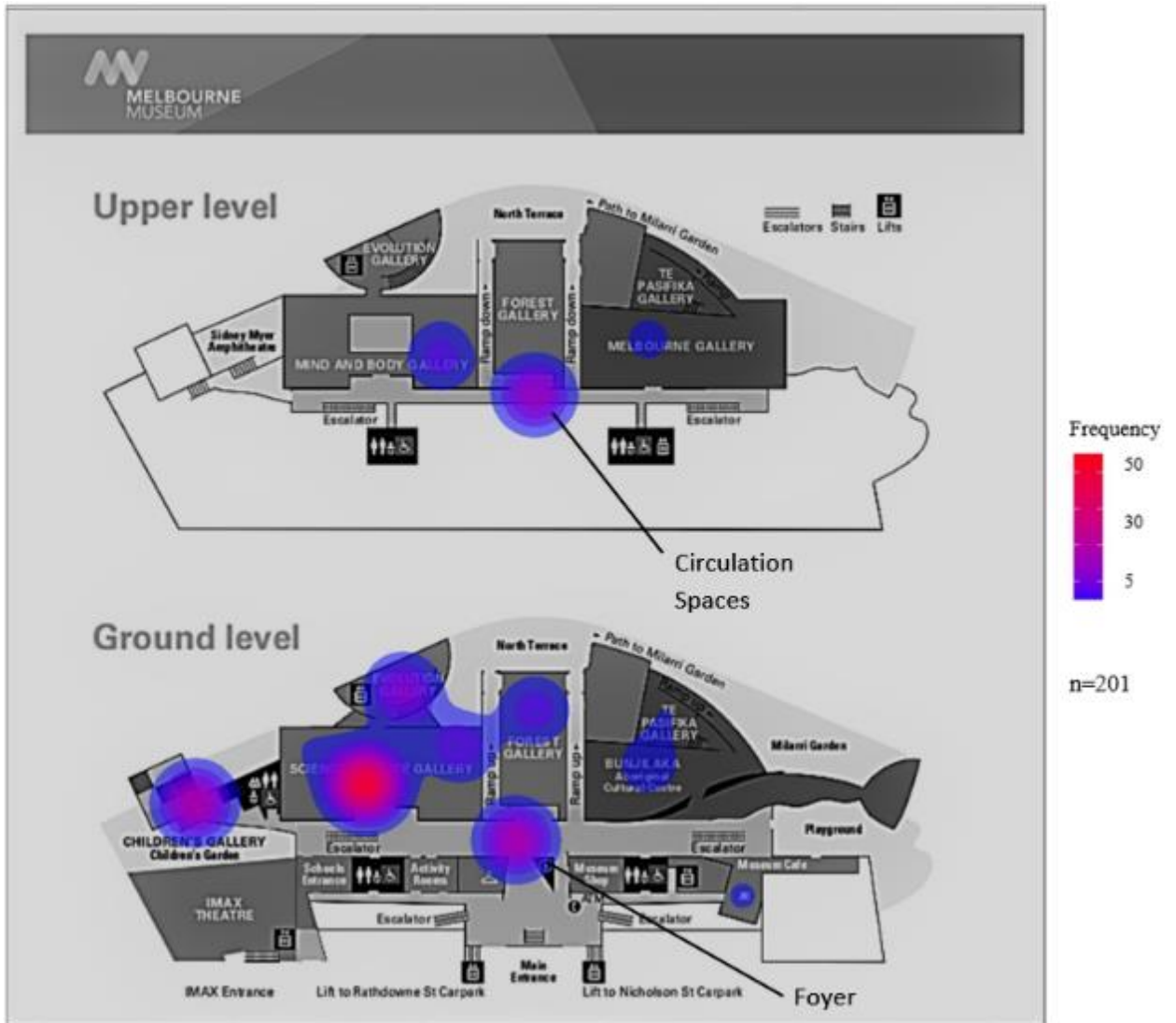


Figure 10: Heat Map of Observed Visitor Mobile Device Use

The density of visitors in the gallery was also important in analyzing why visitors were using their devices at certain times and locations throughout their visit. We defined low, medium, and high density standards based on the physical size of each gallery. The collected data stated that the gallery density was low in 42% of the observations, medium in 38%, and high in 20%.

In addition, we recorded the estimated age and gender of each observed visitor. The data showed that 68% of observed visitors were women, compared to 32% men. In terms of approximate ages, those who appeared to be ages 18-39 accounted for about 70% of all observations recorded. The distribution of observed visitors' approximate ages is shown in Chart

6. Finally, we observed the type of mobile device the visitor was using. These results are displayed in Chart 7. 74% of observed visitors were using iPhones, 24% used Android phones, and 2% iPads. Data tables exported from SPSS displaying the complete data from the visitor observations can be found in Appendix E. Additionally, the official data summary report that was requested by Museums Victoria can be found in Appendix F.

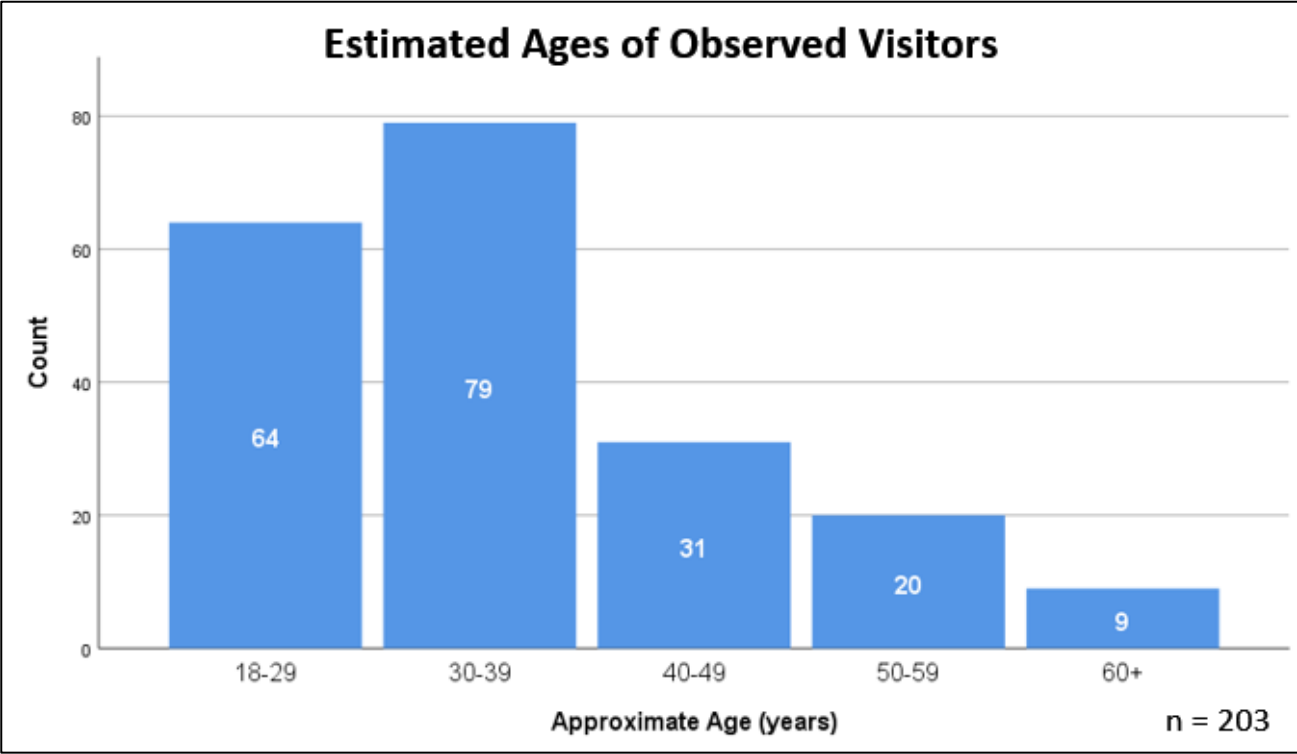


Chart 6: Estimated Ages of Observed Visitors

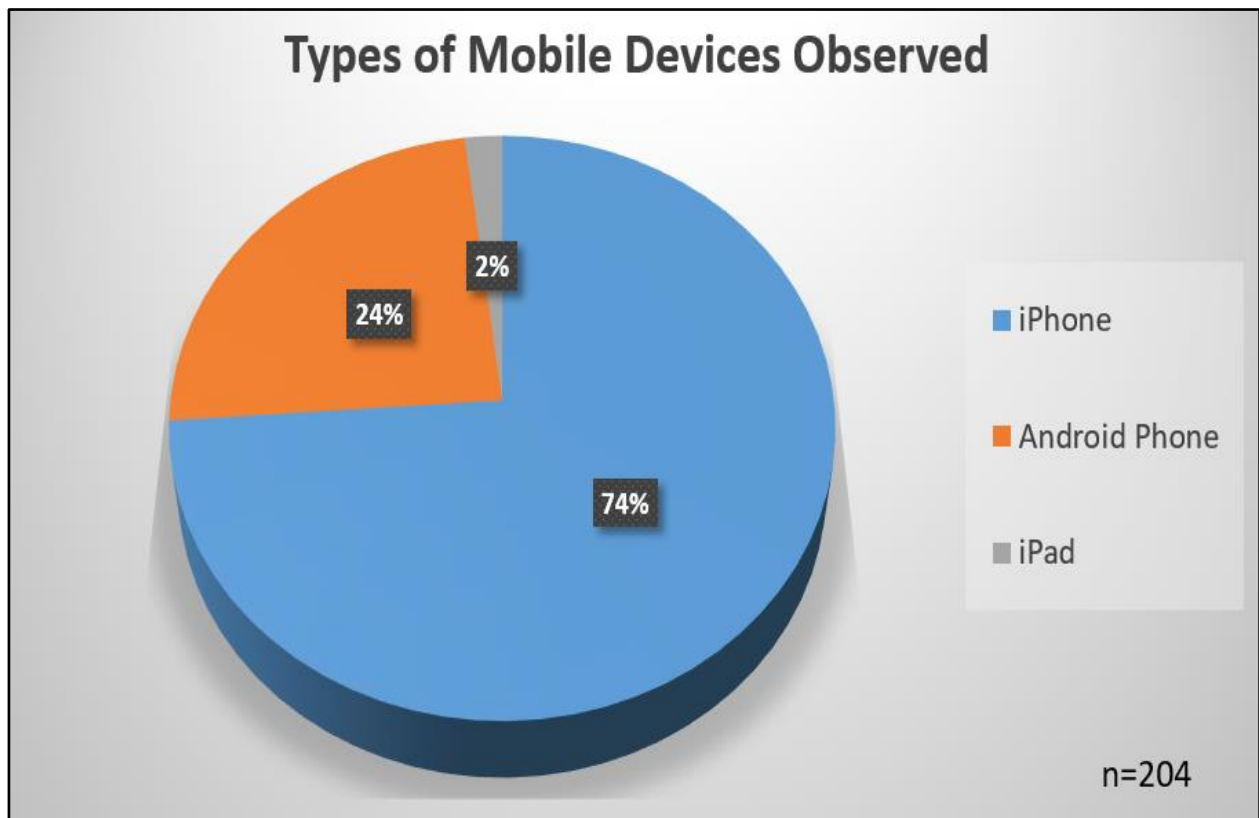


Chart 7: Types of Mobile Devices Used by Observed Visitors

4.1.3 Discussion

As we conducted the exit surveys, we noticed some patterns emerge. As previously mentioned, we found that far more people reported using iPhones in the museum than Androids. This was consistent with the data we gathered from the observations, which also revealed that iPhone use was more popular inside the museum than Android use. Results from surveys and observations both reflect the national averages for device ownership in Australia. For those who did not use or bring their devices, most did not think device use would have enhanced their museum experience. Generally, the respondents who did not use their devices belonged to the older audiences. The average age of people who either did not own a mobile device or owned one and did not use it in the museum was 49 years. The two people who reported not owning any mobile devices were 66 and 70 years old respectively. One of those visitors said that mobile devices were too complicated and the other did not have a need for one. While these were the only two people in our study who did not own a mobile device, several older individuals gave

similar reasons for not using their devices in the museum. Responses from participants 60 years of age and older who did use their mobile device included having no need to use it, not using it in general, and not wanting to be distracted by it during their time in the museum. Of respondents who did not use their mobile device 45% of them were 60 years of age or older.

When looking at the relationship between age and mobile device use, we were surprised by the number of millennials who did not use their mobile devices in the museum. Just over 20% of respondents ages 18-39 reported that they did not use a mobile device during their visit. Due to how much this generation usually relies on their smartphones, we did not expect so many young adults to walk through the entire museum without using one. It is important to note that a local university was administering final exams in the neighboring Royal Exhibition Building during the time that we were conducting surveys and that admittance to the Melbourne Museum is free for university students. One respondent told us that he was a student and owned a smartphone, but did not bring it because he was in the area to take an exam so he left his phone at home because they are not allowed in the testing room. Therefore, it is possible that we surveyed other students who were just walking around the museum before or after taking an exam, so they did not have their mobile devices with them. There were also a few members of this age group who either asked us if it is acceptable to take pictures in the museum or mentioned during their survey that they did not think it was allowed. This confusion may have also led to the unusually high number of millennials not using mobile devices.

In addition, there were a number of respondents that expressed concerns about accessing a map of the Melbourne Museum. These visitors had said they used the internet on their mobile device to look up a map of the museum. Paper copies of a floor plan of the exhibits are not offered to guests upon entry of the museum. However, there are a limited number of maps specifically for visitors who do not speak English.

Although we collected a substantial amount of data regarding current visitor mobile device usage through the 150 exit surveys, conducting visitor observations allowed us to gather additional information from audiences that we were not able to target with our surveys. For example, a large portion of the guests that visited the Melbourne Museum during our time conducting the exit surveys were school children and their respective group leaders. Museums Victoria advised us not to ask the school group leaders to take our survey, because of their responsibility to watch the children, and to not question the children as they are under the age of

18. Therefore, through visitor observations only, we were able to determine what these school group leaders were using their mobile devices for during their time at the museum. Another significant proportion of the visitors to the Melbourne Museum are parents and their young children. Many of them, having small children, declined to take our survey because they were simply too busy. Similar to the school group leaders, we were able to collect data regarding the parents' mobile device usage throughout the museum through our visitor observations.

Our analysis of the visitor observations also included recognizing which of the galleries had the most mobile device usage. Overall, there was a clear trend that related the frequency of mobile device usage to the average popularity of that gallery. At times with the lowest number of people in the galleries, we recorded the most mobile device usage. We hypothesize that this could be a result of fewer visitors, therefore people were more willing to take their mobile devices out and use them for various reasons because it was less crowded.

We noticed a higher volume of mobile device usage in certain galleries of the museum as opposed to others. For example, the Science and Life gallery, the Children's gallery, and the Evolution galleries were frequently filled with visitors, and generally had high mobile device usage. This can be attributed to the fact that many visitors are taking photographs of the large, visually interesting dinosaurs, animals and also their children in these galleries. The circulation spaces and the foyer of the Melbourne Museum were also popular locations for visitors using their mobile devices. We believe that these spaces allowed time for visitors to remove themselves from exhibits, and for them to use their mobile devices for non-museum related reasons. In these spaces, actions such as checking email, texting and social media were observed more than in the museum galleries because visitors were typically intrigued by the various displays. The galleries with low mobile device usage, such as the Mind and Body gallery and Te Pasifika also see less visitation overall. These exhibitions are visited 39% and 25% respectively by all visitors in the museum (Audience Insights, 2016). This is likely the most important reason why there is a difference in mobile device use. Another reason for the inconsistency in use could attribute to the type of information being displayed, such as in the Mind and Body gallery there is less visually impressive displays and more intellectually stimulating content. Less than ideal lighting in the galleries could also be a factor as to why more pictures were not taken in certain ones. Mind and Body, Melbourne story and the WWI galleries are all dark galleries, so people

would either end up with a dark picture or would have to use their flash and risk distracting other visitors.

Capturing the memories of their time at the Melbourne Museum on their mobile devices is important to the visitors as just under half, about 47%, of the total device uses that we observed, were taking pictures. From there, it was determined that the top three subjects that were being photographed were the dinosaurs, family members, and the animals. This is consistent with the visitor observation data, which showed that the Science and Life gallery prompted more mobile device usage than any other gallery in the museum. The dinosaurs are a physically impressive display, capturing visitors' attention and prompting people to take photographs of the various skeletons. In addition, capturing pictures of family members or significant others allows visitors to save the memories from their experiences and look back at them at a later time. We also observed that many of the visitors taking pictures in these galleries were school group leaders photographing the students interacting with the museum exhibits and displays.

Translating the text found on informational panels next to displays only made up just 2% of the observed mobile device uses, shown in Chart 3, which is why it was not listed and is within the "other" category. Although translation apps did not make up a significant portion of the data, we realized that translation apps have been improving throughout the years with the accuracy and speed with which one can receive a full translation. One visitor we observed was translating the text on a panel using an app that utilized the smartphone's camera. The app translated the English words to Chinese in real time and then superimposed the words over the original text so it was easy to read. Within just a couple of seconds, the visitor was able to see the Chinese translation on the phone and read it before moving on. With about one-third of our survey respondents speaking a language other than English at home, utilizing these translation apps could enhance the experience they have at the museum by allowing them to access the information in a language they speak more frequently. The technology used in translation apps is emerging and should be monitored for potential future implementation within the museum.

As stated previously, 68% of visitors using mobile devices were women. We can attribute this high percentage to the fact that there is a high number of women that come to the museum during the week, either as school group leaders, or mothers bringing their young children to the museum. This also coincides with data previously gathered by Museums Victoria in the 2015-

2016 fiscal year, which states that 62% of Melbourne Museum visitors were women (At A Glance 2015-16 Melbourne Museum).

4.2 Define expectations and appeal of mobile technology for enhancing the visitation experience in museums

Through conducting site visits and an exhibit interest rating exercise, visitors' expectations and appeal of mobile technology was assessed. This was important when providing useful recommendations to the Audience Insights staff of Museums Victoria.

4.2.1 Results from Site Visits

To better understand some of the current mobile technologies implemented in museums around us, we conducted site visits to the Worcester Art Museum, as well all three Museums Victoria institutions. Prior to departing Worcester, we visited the Worcester Art Museum, and spoke with Jeffrey Forgeng, the curator of arms & armor and medieval art as well as Katrina Stacy, the associate curator of education and experience. They informed us on some of the current technologies in place at the Worcester Art Museum. At that time, the extent of the museums' mobile technology was limited to an audio device called a "wand." These wands were fairly large and bulky devices, resembling a television remote. Visitors could rent a wand from the front desk and take it with them throughout the museum. Headphones were not available for rental but personal headphones were compatible. There were specific locations next to certain art pieces that prompt the user to enter the number displayed and listen to the information given. The audio was very informative, commenting on the subject of the piece and also the history behind it. In the past, the Worcester Art Museum attempted to implement a link that would take the user to a website with an audio tour available on their mobile device. Unfortunately, the portion of the museum in which the tour was meant to take place had poor cell service and visitors were not able to access the site that gave the audio tour. A picture of this wand can be found below in Figure 11.



Figure 11: Worcester Art Museum Audio Tour Wand
(Museum of Native American history, *n.d.*)

Once in Melbourne, we visited the Immigration Museum and downloaded the *MV Multilingual Tours* application available for use throughout the museum. One of our team members is fluent in Spanish, so we were able to try out the Spanish version of the audio tour. The experience begins with a welcome message from a narrator, acknowledging the traditional owners of the land where the Immigration Museum is located. Each page in the *MV Tours* displays a picture, play and pause buttons, and a transcript of the text in the recording. At the bottom of each page there are also directions guiding you to the next room, and clicking “Next Stop” directs you to the page for the next room. Screenshots of the application can be found in Figure 12 below. Despite clear navigation directions, the app is limited by only providing a brief outline of the artifacts and information found in each room and the not go into detail about specific items on display within each room of the museum.

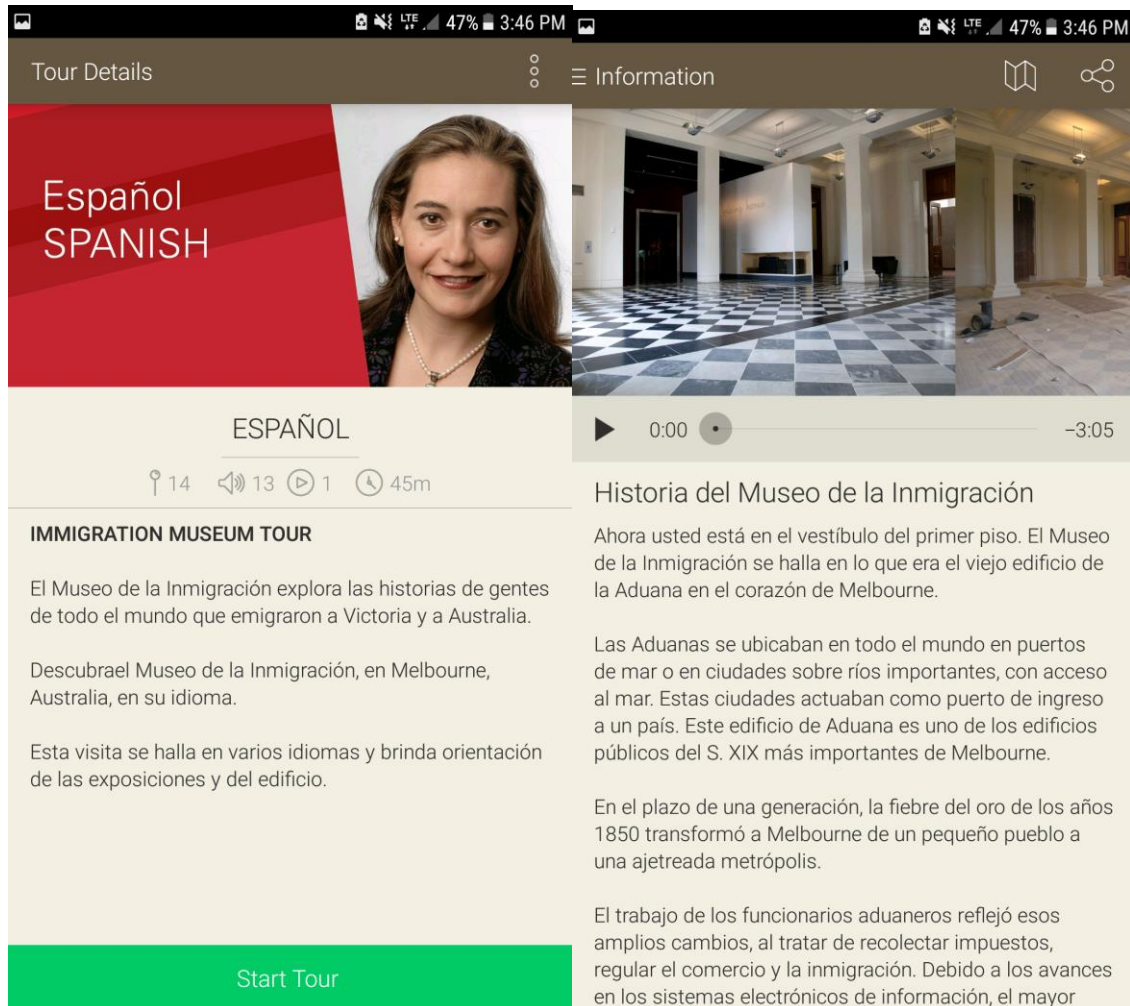


Figure 12: Screenshots of *MV Multilingual Tours* app Spanish tour

In addition, we visited the Scienceworks museum, which targets young children and families. During our visit, we noticed that many of the exhibits were highly interactive and included technology like touchscreens and motion sensors. In particular, the *Sportsworks* exhibit displayed different kinds of sporting equipment and demonstrated different exercises visitors could do. At each display within the exhibit, there were questions visitors could answer, related to the specific sporting activity they performed at that display.

The majority of visitors interacting with the Scienceworks exhibits were school children and families with small kids. Although we were interacting with the exhibits, they did not seem to be meant for adult use. For example, in the *Sportsworks* exhibit, there was a baseball activity where a visitor could throw a ball at a target and the system would tell you how fast the ball was

thrown. This activity worked for kids, but did not work well for adults. It did not accurately gauge the speed of a ball traveling at a height from which an adult would throw. We tried it several times and the machine either did not read the speed at all or displayed an inaccurate reading. There were similar situations to this throughout the museum where the systems were designed for the abilities, height and overall size of children. Overall, we found the Scienceworks museum to be very focused on children, less informative, and more physically interactive than any of the other museums we visited.

During the Melbourne Museum site visit we were given a brief tour guided by a volunteer that outlined the main exhibits in the Melbourne Museum. After the tour, we walked around on our own to familiarize ourselves with the exhibits and overall layout of the museum. We found out that there is a free Wi-Fi network for museum visitors, as well as a specific Wi-Fi network inside the Bunjilaka gallery that is supposed to allow one to read about community contributors and view the *Many Nations* digital labels while in the gallery. The museum also had interactive displays utilizing technology like the tablets in the *Wild* exhibit that used a camera and allows the user to view the individual animals around the room and click on one to view more information about it. There was also a QR code on the second floor foyer that was intended to provide more information about the Meszaros medals that were adjacent to it. However, the QR code did not function correctly and visitors are unable to receive the information they were seeking. Although there were a number of interactive experiences in the Melbourne Museum, mobile devices were not being heavily utilized in any of the exhibitions or displays throughout the museum.

4.2.2 Results from Exhibit Interest Rating Exercise

We integrated an exhibit interest rating exercise into our survey to ask visitors how interested they would be in specific exhibits involving technology that have been implemented in various museums around the world. The ratings were based on a 5-point scale, where “1” represented “very uninterested” and “5” represented “very interested.” We described each exhibit without using any technical terms to ensure that all participants were able to understand the experience. The data shows that the virtual reality (VR) exhibit received the highest average rating (4.1/5) from visitors, while augmented reality (AR) was not far behind with an average rating of (3.9/5). The percentage of people who reported that they were either “interested” or

“very interested” in VR and AR were 82% and 72% respectively, which led to the high average ratings. An exhibit that includes a QR code that visitors can scan for more information received the lowest average rating (2.9/5) of the five experiences described.

Due to the fact that people in different generations often have different opinions regarding technology and its role in everyday life, it was important to analyze the correlation between people’s reported ages and their interests in exhibits involving technology. The data reveals that more members of the younger audiences (ages 18-39) reported being “very interested” in VR and AR than those ages 40 and above. 45% of people in these younger audiences reported that they were “very interested” in VR and 53% were “very interested” in AR. For those at least 40 years of age, the corresponding statistics were 37% and 22% , respectively. Despite the older audiences reporting less often than their younger counterparts that they were “very interested” in these two experiences, the data does suggest that they are interested in these exhibits. 78% of people ages 40 and above said they were either “interested” or “very interested” in VR, while 59% showed interest in AR. It was also not always the case that younger audiences displayed more interest than older visitors in the exhibits we described. For example, visitors in their fifties were far more interested in audio tours and scanning QR codes than any other age group. 50% of this audience reported being “very interested” in audio tours, which was about 24% higher than the age group (ages 40-49) with the next highest proportion of “very interested” visitors. Similarly, 43% of people in their fifties were “very interested” in scanning QR codes for more information on an exhibit, about 23% higher than the next highest age group (ages 40-49). All data from this exercise can be found in Appendix G.

4.2.3 Discussion

To familiarize ourselves with some of the current uses of technologies in museums, we decided to visit the Worcester Art Museum prior to traveling to Melbourne. When we inquired about the audio tour wands at the Worcester Art Museum, the receptionist seemed surprised because not many people know about the device. The Worcester Art Museum attracts older visitors who do not necessarily use technology and believe they can have a good museum experience without it. While using the wands, we found it tiring to have to hold up the wands to our ears to hear the entirety of the audio because the wands were clunky and headphones were not provided. Although it was inconvenient to hold up to our ears for long periods of time, the

information in the audio tour was different from the text adjacent to each piece of art or artifact, making it interesting and engaging. While speaking to Katrina Stacy, we learned that each wand costed the museum about \$1,400, resulting in the museum staff not wanting to remove them from general visitor use, despite not many visitors asking for the wands. In addition, we visited the Worcester Art Museum on a Wednesday, which most likely contributed to the fact that there were very few visitors there, making it seem unpopular. Overall, we found the Worcester Art Museum to be mostly text displays, with very few opportunities for mobile device usage.

Similar to the Worcester Art Museum, many of the galleries in the Immigration Museum used text to display information about throughout the exhibits. Much of the museum experience included a great deal of reading because the audio tour did not provide much depth about the items in each of the galleries. We also noticed that the museum was relatively empty, and the few visitors that were present were older adults. While speaking with a member of the Immigration Museum customer service staff, he informed us that many of the people that visit the museum are often older visitors who are visiting for the first time. He also informed us that the museum has low attendance compared to other museums under Museums Victoria.

The displays at Scienceworks were highly interactive with numerous activities in each of the galleries. Although the experience was very hands-on, we were unsure how much educational value this museum provided the community. The children in the museum seemed intrigued and excited about each of the activities, but each display would only keep the child engaged for a few minutes at most. There were also many activities that we found interesting, but were unable to participate in, because of our size. This is largely due to the target audience being children. We believe there were fewer opportunities to use mobile devices in Scienceworks than in other museums we visited because parents were often looking after their kids and couldn't spend extended periods of time on their smartphones.

Throughout the Melbourne Museum there were many opportunities to use the technology implemented in the galleries, but very few experiences that utilized the visitors' personal smartphones. The QR code on the second floor foyer next to the Meszaros medals brought the user to an error page, which meant that Museums Victoria staff had not fixed the code. Staff may had not fixed the QR code yet because of lack of interaction with the code by museum visitors, or lack of awareness that the code is dysfunctional. Another mobile technology that was available for visitor use was the Bunjilaka gallery Wi-Fi network called "FirstPeoples" that

allowed visitors to view more information while in the gallery. The advertisement for the network can be seen in Figure 13. Visitors may not have realized this Wi-Fi network existed because the signs were relatively small and only a few throughout the exhibit. In addition, connecting to this network did not prompt any action or tell the user to go to a specific website, so visitors were unable to access the information from the digital labels. While conducting observations, we did not observe a single visitor trying to access or view the *Many Nations* digital labels. This gallery already had interactive technology implemented throughout, so it could be that visitors felt they were already interacting with the exhibits enough and did not need to access more information.



Figure 13: Picture of Sign Displayed in the Bunjilaka Gallery

The exhibit interest rating exercise indicated that most people were interested in the VR and AR exhibits, with 45% of people in these younger audiences reported that they were “very interested” in VR and 53% were “very interested” in AR. For those at least 40 years of age, the corresponding statistics were 37% and 22% respectively. It is possible that this is because younger people are often more comfortable with technology than older audiences because they have grown up using it. We heard from several older participants that they were not interested in

some of the experiences that we described because they either did not use their smartphones very much or did not know how to use them. Perhaps older audiences showed greater interest than younger ones in audio tours and scanning QR codes because they require little technical knowledge. The VR and AR exhibits might also have scored highly because they are visually stimulating experiences that do not require reading. Most museum exhibits tend to require that you read some text underneath the display to learn more about the topic. However, VR and AR offer a visual, and possibly audible, method of learning, which might be of interest to visitors who do not want to read at every exhibit.

During the exhibit interest rating exercise, many visitors did not simply rate the experiences, but also gave us a reason as to why they felt the way they did. Once all the results were in, we analyzed those comments to see what patterns emerged. One general visitor comment that we heard repeatedly was that people did not want to download an app on their device just for a trip to the museum. Some said that they would be interested in the various experiences if they were available without having to download anything, or if there was a device provided by the museum with the application pre-installed that they could use. Many visitors also mentioned that they would be more inclined to participate in these interactive exhibits if there was free Wi-Fi available. The museum does provide free visitor Wi-Fi, but it seems that people either had trouble connecting to it, or did not know about it. When connecting to the visitor Wi-Fi on a mobile device, a screen is supposed to be displayed where users must accept the terms and conditions of the network. However, iOS devices did not always display this screen, so some iOS users were not able to connect to the network. This is one example of an issue that visitors experienced while trying to connect to the free Wi-Fi.

We received some comments that were specific to exhibits we described to participants in the exhibit rating exercise portion of our survey. A couple people told us that they did not carry headphones around with them, so they would only participate in an audio tour if the museum provided headphones. Two visitors also said that if they were to use an app that sends additional information to their devices based on their location throughout the museum, they would want to have complete control over what information they receive. This would ensure that visitors are only getting additional information on topics in which they are interested, and not be bothered by unwanted information. Eight people reported that they had no need to use their devices, or felt that museums already contain an overabundance of information. Therefore, these people may not

be interested in activities that give them more detail, such as QR codes or the Bluetooth beacon application.

After we described the exhibit containing a QR code to the visitors, we heard multiple times that respondents did not think people really used QR codes anymore. It is possible that people did not use QR codes very much when they first became available because a separate QR code scanner application was required. However, on Snapchat and the latest smartphone operating systems, QR code scanners are built into the camera. Therefore, most people no longer have to download a separate application to scan a QR code. Now that this is becoming standard for smartphone cameras, QR codes could be a more attractive means of gathering information for museum visitors. This assumes, of course, that people are aware of this functionality. If a QR code were to be implemented, a sign informing people of how they can scan the code might be helpful for those who did not already know.

4.3 Evaluate visitors' responses of an upcoming museum exhibition

The initial responses and thoughts of visitor engagement with the Inside Out exhibitions were evaluated and feedback was collected through individual reflection and two different focus groups.

4.3.1 Results from Inside Out Exhibit Audio Tour

The *Inside Out* exhibition testing consisted of two sessions. The first session was made up of eleven WPI students, including ourselves, and our advisor Fred Looft, and the second with six students, and our advisor Karen Oates. Before starting the experience, the developers of the exhibition gave an overview of the different scenes within the space and the walking path one would follow to get to each display. The briefing was given primarily because the items for the exhibition were still in the processes of being made and had not yet been displayed. Pictures of the displays were set up at each location, as well as tape on the ground around the exhibition to show what it will look like when complete and tape on the floor surrounded the pictures to give the testers an idea of the approximate size of each demonstration. A picture of the briefing and an example of one of the mock demonstrations can be found in Figure 14 below.



(a)



(b)

Figure 14: (a) First group getting briefed on the overall exhibition and (b) student standing next to one of the items that is going to be on display while testing.

Once the briefing was over, each participant was handed an iPod Touch and a pair of headphones. The exhibit utilized an application called Detour. Detour uses the iPod's global positioning system (GPS) to track where in the exhibition space the user is located. The iPod uses the GPS to know when the user has reached the starting and ending locations so it can play the appropriate audio. Upon reaching the starting location, the app's audio directed the user's attention toward a large statue of Mercury hung from the ceiling above the entrance to the exhibit. Once that audio has concluded, it told the user to walk forward to the first stop on the tour: an Aboriginal walking stick. At this stop, a woman told a story of her personal connection to the stick through the audio. When she was done, the user was directed to the next stop. However, unlike the experience at the walking stick, the user's arrival at the next stop did not trigger the supplementary audio. None of the subsequent stops inside the exhibit actually used the GPS location. In most cases, the users were directed where and when to move through the audio, but there were a couple transitions that lacked such a prompt, leaving users confused because they were hearing a story about something different than what they were looking at.

Upon departure of the exhibition space, the user’s GPS location triggered the last audio recording. Detour was not very accurate when detecting the user’s exact location relative to the final stop, causing some testers to walk up to about 10 meters past the final stop. After attempting to find the ending location for a while, some testers gave up on finding it altogether.

Once everyone in each session was finished testing, a focus group regarding the experience was held. The discussion was recorded and notes were taken as Carolyn, from Audience Insights, asked the group questions about their experiences. The results were written up in a data summary report and can be found in Appendix H.

4.3.2 Inside Out Exhibit Audio Tour Discussion

The results from the focus group held after experiencing the exhibit revealed some common themes that members from the pilot sessions were feeling. The technology used in the exhibit was discussed and participants thoughts regarding the technology was recorded. Chart 8 recaps the pros and cons of the *Inside Out* exhibit as discussed by our team, and the rest of the WPI students.

Pros	Cons
<ul style="list-style-type: none"> ● Limited amount of reading text, mostly audio tracks which appeals to younger generation ● Positively changing guest perceptions of what a museum exhibition can include ● Various interesting and engaging displays, such as animals, rocks and a polar bear 	<ul style="list-style-type: none"> ● If using your personal mobile device, it needs to be an iPhone ● Some versions of the iPhone no longer have headphone jacks to support headphones provided by the museum ● Detour application used GPS to trigger audio tracks. Sometimes the app did not recognize where the device was, and the audio would not play at the correct time. ● Audio cues indicating when to move throughout the exhibit were unclear. ● Stories to accompany the displays were confusing and frequently unclear

Chart 8: Pros and Cons of the *Inside Out* Exhibition

To begin the *Inside Out* experience, an iPod touch was provided to each of the participants to experience the exhibit, and there is also the option to use a personal device. If a personal device was used then the participant would have to download the Detour application, which is only available on Apple products. This could cause some issues because it will take time to download this app, especially when using the Museum Visitor Wi-Fi network, and people will most likely be unwilling to use data to download it. Headphones were also provided with the iPod touch, however if a participant wants to use their own device they would have to use their own headphones or borrow them from the museum. This caused issues with users who have iPhones generation 7 and higher because an adapter is needed for the headphone jack.

Concerns about the audio tour portion of the exhibit were also expressed. Users voiced issues with audio cues and when to move through different sections of the exhibit. A number of suggestions were brought up in the focus group such as rather than a continuous stream of audio, different audio clips at each part of the exhibit, so it would be clearer when to move to the next section. This could be achieved by GPS tracking of the device, which triggers the audio for the next section, or button to move onto the next audio clip. However, the GPS tracking of the device was not as accurate for some as it was for others. Once outside the exhibit the final audio clip was triggered by the GPS and for some, the location shown on the device was inaccurate by more than 10 meters.

Other comments about the exhibit not specifically pertaining to technology were also discussed and recorded. Firstly, we discussed the target audience of the exhibit. Museums Victoria developed this exhibition with the intent of drawing in those in their twenties. The discussion group agreed with this target audience, acknowledging that the minimal reading required and use of mobile technology is appealing for that generation. Some content of the experience maybe unsuited or inappropriate for children and too complex for some to understand. The discussion was then shifted towards the content of the exhibit, the flow of information, how it was presented to the guests. It was revealed during the discussion that the exhibit was about capturing moments in time- past, present and future. For some of the participants, this was not obvious during the experience and some clarity was only gained after being explicitly told the purpose was to capture moments in time. Confusion was a common feeling from participants during the discussion afterwards. The connection between the different portions of the exhibits, as well as the narration, was unclear to many of the focus group

participants, which caused most of the confusion. At each display, the narrators would frequently change, where some sections were personal stories told by a narrator whereas in others the narrator just spoke about the display.

Another goal that Museums Victoria wanted to accomplish with this experience is changing the way this generation thinks of museums. The experience involved some aspects that are not typically found in a museum exhibit, such as humor, as well as an opportunity to take a selfie with one of the displays. This exhibit, for some, provoked a different feeling than they had previously experienced at a museum, possibly positively changing their perceptions of what a museum can be.

The focus group also discussed what participants felt was missing from the experience. The most prominent concern that users expressed was not having enough information about certain pieces in the exhibit. Many suggestions were made to remedy this concern, some of which included providing pamphlets with information about the pieces, labels with writing on the displays, and also a website that included more information. There was no clear consensus on how more information would be given to the participants, mostly because people were split on the timing of when the information would be given, either immediately or after the audio tour had concluded.

4.4 General Discussion

The complete analysis and discussion of each individual objective revealed some general patterns regarding visitors and their perspectives on mobile device usage throughout the Melbourne Museum. Firstly, determined through the exit surveys and the visitor observations, the majority of visitors used their mobile devices to take photographs of various animals, displays, and people they were with. Overall, guests revealed that capturing pictures allowed them to keep memories of different aspects of the museum, as well as family and friends, to look back at them at a later time. Another theme that was evident through the exit surveys and the visitor observations was that people are mostly using their mobile devices on the first floor of the western wing of the museum. This includes the Children's gallery, the Science and Life gallery, some circulation spaces, and the Evolution gallery. These exhibits provoke people to take pictures because of their visual displays and the high number of children visiting them.

We believe that the most common reasons that people chose not to use their devices were that they did not want to be distracted by the devices and they believed the museum had enough interesting displays to see. We also found that the older visitors are not as likely or willing to use their mobile devices throughout their museum experiences. Through the visitor observations, it was evident that the majority of those using their devices in the galleries were approximately ages 18-40, with very few being over the age of sixty. This trend was also apparent through the exit surveys. They did not see a need for using these devices in the galleries, possibly because the older audiences have a preconceived notion of the traditional museum setting, learning from displays, and reading textual information.

The final overall trend that we noticed is that museum visitors were generally open to using their mobile devices for different experiences throughout the museum. With an overall average response rating of a 3.5 out of 5, visitors showed more interest than disinterest in the various technological experiences that we described in the exhibit interest rating exercise.

Although we were able to uncover important themes and trends from the data, there were also various challenges faced. While conducting our exit surveys, various inconsistencies between members of our team could have potentially influenced our data. For example, some questions may have been phrased differently while administering the survey, provoking slightly different responses from the interviewee. In addition, some respondents could not recall exactly what they took photographs of, or they did not provide us with all the reasons for using the mobile devices throughout the museum. Finally, many respondents were accompanied by at least one other person when answering our survey questions, and could have been influenced by the others' reactions to the questions.

These overarching themes and challenges that were uncovered by the entirety of our methods aided us in developing thorough, useful recommendations to Museums Victoria regarding the current use of mobile devices in the Melbourne Museum as well as the expectations and appeal of new technology

Chapter 5: Recommendations and Conclusion

Part 1. Recommendations

After developing a more in-depth and data based understanding of the mobile device usage and expectations of visitors in the Melbourne Museum, the team provided recommendations to the Audience Insights Team for further development of mobile technology to enhance the visitor experience. The results revealed patterns in device usage that inspired our recommendations for mobile device technology implementation in the Melbourne Museum.

Implement an interactive digital map that can be accessed on mobile devices and provide paper maps at museum entrance.

Scattered throughout the museum are large navigation signs directing visitors toward the nearby galleries. On the bottom of the signs is a map of each floor of the museum and a small indicator to show visitors their current location. Figures 15 and 16 show signs located in the foyer of the Melbourne Museum placed near the entrance. While conducting the exit surveys, we noticed that many people said they would have liked an electronic map on their smartphone to supplement the maps on the signs. Based on this feedback and the fact that paper maps of the museum are not currently available, we recommend that Museums Victoria create an interactive digital map that could be accessed on a mobile device. This map could be on the Museums Victoria website for visitors to access before and during their visits. Another consideration is to put the map into a smartphone application and use a location service to show the user their current position, helping them navigate through the museum. Whether displayed on a website or a smartphone application, the map should allow the user to click on galleries to read a short description of the exhibits and look at some photos of the displays. This interactive feature would give the visitors a sense of what is inside the gallery before entering.

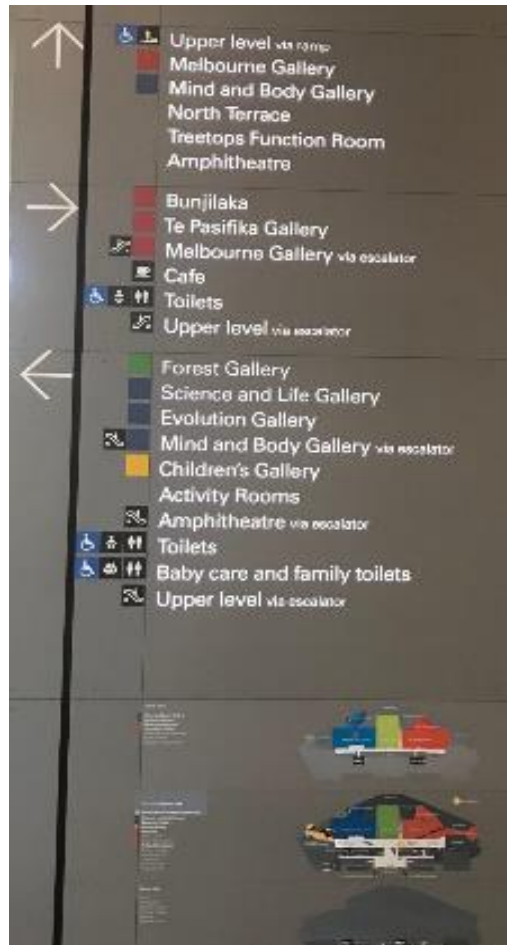


Figure 15: Navigation Sign in Foyer of Melbourne Museum

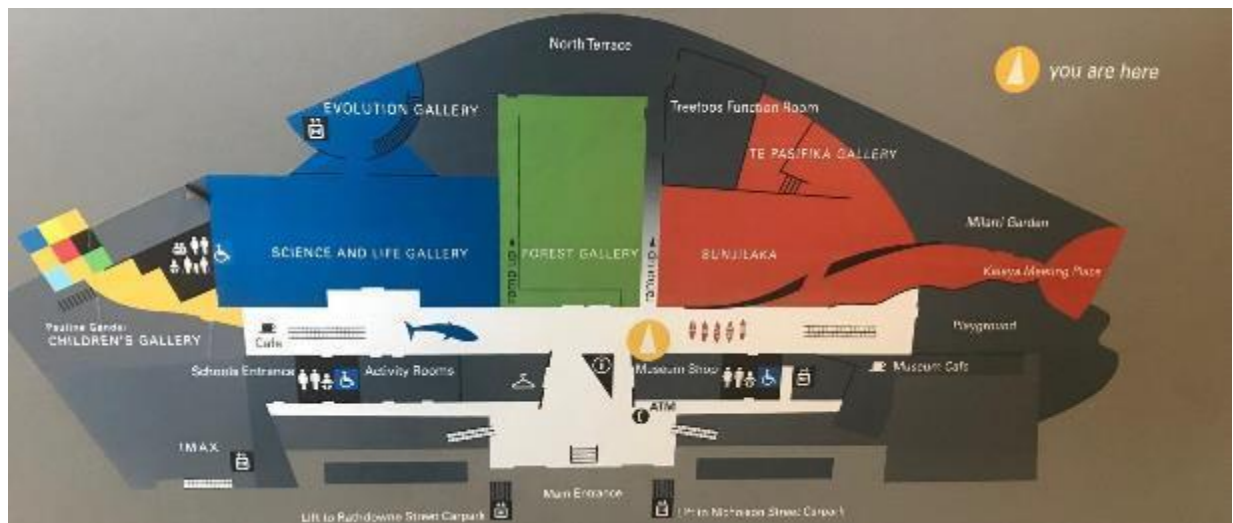


Figure 16: Map of Ground Floor of Melbourne Museum on Navigation Sign

The maps displayed on the large signs can be found on the Museums Victoria website, but many visitors either did not know about them or did not think to look them up. Therefore, the interactive map implementation should be widely advertised to the visitors to make them aware of its availability. Regardless of whether or not the museum decides to create an interactive map, we recommend that paper maps be made available so people can carry them around the museum. These would be helpful for people who did not have a mobile device, do not have their devices with them, or would rather read a paper map than navigate the museum from their smartphones.

The production of either a new online or application based interactive map would require both a development team and funding sources to be secured. The team would have to determine which location service would best serve their needs, whether it be utilizing Bluetooth beacons, an internal GPS, or Wi-Fi triangulation, which is a method of determining a device's location within a Wi-Fi network. Some criteria to consider would be location accuracy, cost, and the amount of maintenance required for each method. Of these three methods, Bluetooth beacons are the most accurate, but also require extra hardware and a more complicated setup process than the other services. On the other hand, Wi-Fi triangulation would be able to use the existing visitor Wi-Fi network, but it is far less accurate than Bluetooth beacons. Finally, global positioning systems are now built into virtually all mobile devices, but they require lots of battery power and lack location precision, especially indoors (Kosir, 2016). While there are some technical decisions that would need to be made, an interactive map application or web page would enhance visitor experiences by helping people navigate throughout the museum to easily see all the galleries that interest them.

Advertise the availability of free Wi-Fi with instructions on how to connect to it.

While completing the exhibit interest rating exercise, some visitors mentioned that they would interact with some of the technological exhibits if free Wi-Fi was provided. Museums Victoria provides free visitor Wi-Fi in all three of its museums, but some visitors did not seem aware of it. In addition, a few people said they knew about the free Wi-Fi, but had trouble connecting to it. Therefore, we recommend that the museums better advertise that there is free Wi-Fi available and post instructions on how to connect to it using both iOS and Android platforms. Doing so would likely increase visitor mobile device use in the museums. It is also worth noting that nearly half of the visitors we surveyed were not from Australia and some

reported that they did not use their mobile devices because they did not want to use expensive international cellular data. Advertising the free Wi-Fi would also address this concern, and potentially increase mobile device usage as well. If Museums Victoria wishes to implement features that integrate mobile devices, it is expected that advertising the free Wi-Fi will increase their popularity.

Advertisements for the free Wi-Fi would be relatively inexpensive as signs at the entrance and around the museum would adequately inform visitors. The only potential issue with this advertisement would be not being able to offer it in every potential language that visitors speak. The museum website can also advertise the free Wi-Fi so visitors know before entering the building that they can use their devices.

Incorporate an augmented reality photo station near the Dinosaur Walk exhibit

Due to the most popular device use being photography and the majority of those photos being taken in the dinosaur exhibit and of family members, we recommend that the museum incorporate a station for people to take pictures along the Dinosaur Walk exhibit. We envision an iPad mounted on a stand with the camera facing a wall, where visitors can pose for a picture in front of a variety of computer-generated Jurassic-themed environments. For example, one background could contain a dinosaur appearing to chase after the visitor. There would be markings on the floor to indicate where visitors should stand in order to be captured in the picture. Visitors would be able to take pictures of their friends and family, or set a timer on the device so they can get a group photo. It would have to be made clear to the visitors, through signs or the title of the booth, that the experience is fictional and does not resemble reality. Similar to the *Pointillize Yourself* application implemented in the IMA, this app could give people the option of adding their photos to a slideshow or a display projected on a wall. Our data showed that people took photos in the museum mostly to retain memories, so they would also be able to save or share their images on social media.

The physical production of this photo station as well as the technology required to produce it might have significant costs. The price of materials for the physical aspects of the station, such as the iPad and stand it would be on would need to be taken into account. The price of creating the computer generated images would be substantially greater than the physical elements and would take time for developers to create.

Due to the interest visitors displayed in augmented reality, their tendency to take photos of the dinosaurs and their family members, and the success of the *Pointillize Yourself* activity at the IMA, we believe this activity would be a popular addition to the Life and Science gallery.

Create a digital Melbourne Museum scavenger hunt application

While conducting exit surveys, a couple of museums visitors approached us asking questions about where certain objects were within the museum exhibit because they were completing a scavenger hunt and recording their responses on paper. We believe that this experience could be offered through a smartphone application for a new and innovative way to ensure people visit every gallery in the museum. Upon review of the data from the Melbourne Museum's 2015-2016 *At a Glance* report, we were surprised to see that most guests who attend the museum do not visit every gallery. For example, only 23% of respondents report visiting the Bunjilaka gallery (Audience Insights, 2016). A scavenger hunt experience would improve visitation to each of the galleries in the museum and furthermore enhance engagement at the exhibits, especially those included in the scavenger hunt. Also, as we walked around the museum, we noticed that many school groups were filling out a worksheet as they explored the various galleries. A scavenger hunt could replace the worksheets, making the experience more interactive, educational and fun. It would also force students to think about the exhibits, rather than simply looking for the answers to questions on their worksheets, so they could learn more from their visit.

The scavenger hunt application could provide users with multiple scavenger hunts varying in difficulty and approximate duration. Upon completion of the scavenger hunt, users could be rewarded with a badge or points within the app so they are encouraged to complete different experiences each time they visit. After completing some additional research, we have found various scavenger hunt platforms that Museums Victoria could utilize to create their experience. For example, [Eventzee](#) and [Hack & Hunt](#) both allow someone to create a custom scavenger hunt game for iOS and Android devices. We believe this experience could be beneficial to the desired increase in mobile technology, and should be further researched by Museums Victoria.

There are several considerations that would need to be addressed before implementing a scavenger hunt application. The cost would depend on whether the museum decided to use an

existing third-party application, such as Eventzee or Hack & Hunt, or create their own. Creating their own application would make the project far more expensive, as they would have to pay a team of developers and project managers. If they used a third-party app, they probably wouldn't need developers to customize the activity, but it would still take a long time to come up with multiple hunts for each difficulty level and estimated duration. Another potential cost would arise if the museum decided to hand out devices for people to use if they do not have their own. They probably would not need too many devices to hand out, as most people would likely use their own devices if they could successfully connect to the visitor Wi-Fi. The team would also want to decide if the scavenger hunt is included with museum entry or if it will cost extra to use. In addition, the museum would have to consider how difficult it would be to update specific scavenger hunts when galleries change. Similarly, they would have to come up with a plan for what to do when exhibits needed for the scavenger hunt are under renovation. Given all these considerations that would need to be taken, a scavenger hunt application could be a large investment for Museums Victoria to be completed over a long period of time, but it would be an innovative way to engage visitors of all ages and help them interact with each exhibit.

Part 2. Conclusion

The purpose of this project was to “provide [Museums Victoria with] a benchmark study that will capture a picture of current use and provide a point of comparison for a future where mobile devices within a visiting experience might become more significant” (Meehan, 2017).

Ideally, if we had additional time and resources, the team would have liked to implement and pilot new mobile device technologies to understand the incentives for using their devices throughout their experiences. Alternatively, we were only able to understand how museum visitors potentially might utilize mobile technologies during their visits, through providing theoretical exhibition experiences.

Through our time working with the Museums Victoria organization, we were able to establish the type and level of technologies museum visitors are utilizing everyday, and how they are currently utilized during a visit. We hope that our results and recommendations can be used by Museums Victoria in furthering their mission of “leading Museums that delight, inspire, connect and enrich” (Museums Victoria Annual Report 2015/2016, 2016).

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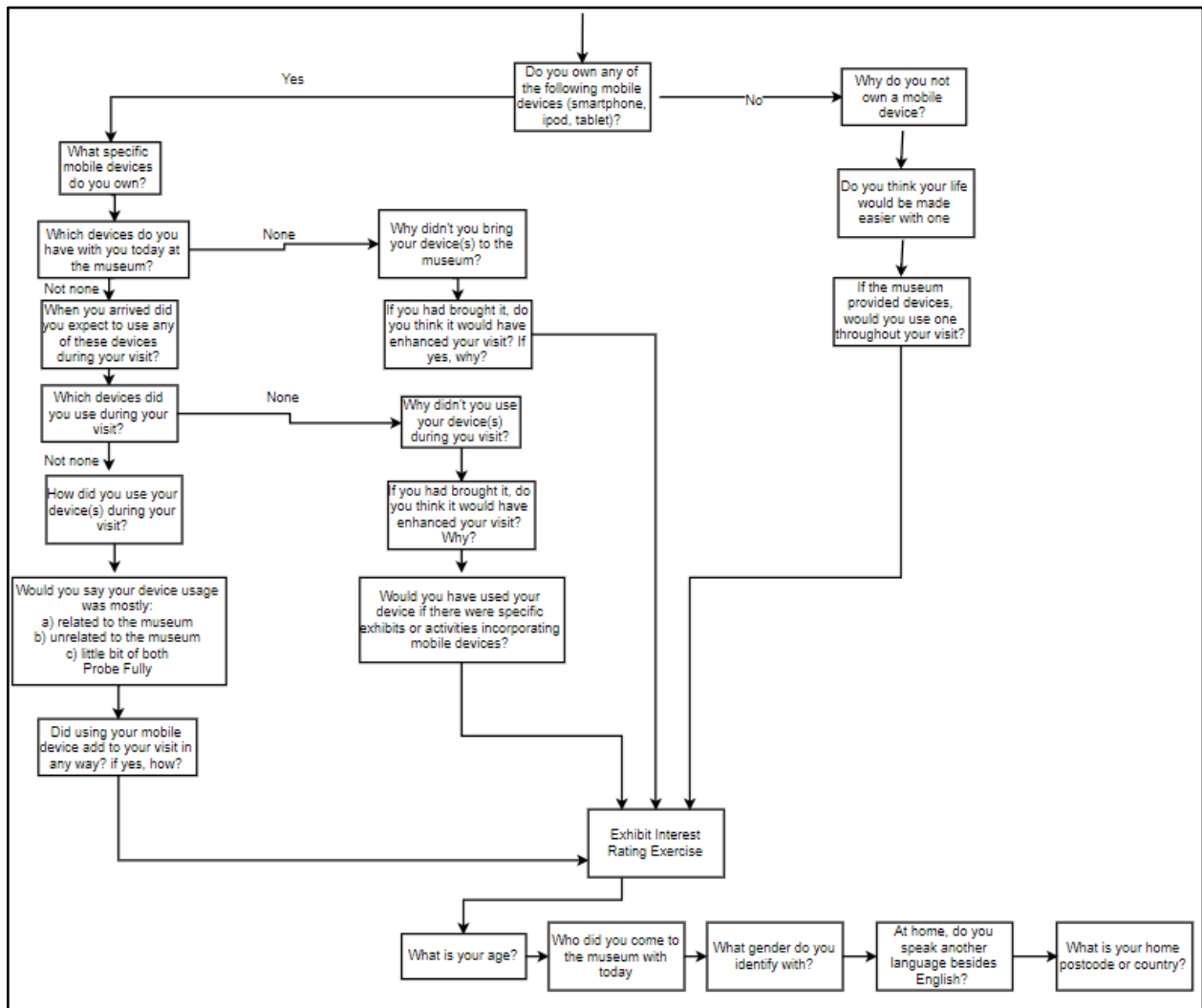
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Appendices

Appendix A: Guest Exit Survey

This exit survey was administered electronically by asking the respondents questions in the format of an interview. When conducting the interview, the interviewer started with the top question in the flowchart below, then followed one of the paths, based on the respondent's answers. Every path led to the exhibit interest rating exercise described in section 3.2.2, then demographic questions. This survey's purpose was to provide information about current smartphone use in Museums Victoria.



Appendix B: Exhibit Interest Rating Exercise

I will now read out a couple of existing experiences available in other museums that involve using mobile devices. Could you tell me your interest level in each of these experiences.

1. Scanning a QR code located next to an exhibit for more information on the exhibit's topic

1	2	3	4	5
Very uninterested	Uninterested	Neither interested nor uninterested	Interested	Very interested

2. An exhibit in which you can hold your mobile device up to the exhibit and see an images on your phone screen that don't exist in reality, for example, dinosaur bones to see what the living dinosaur might have looked like

1	2	3	4	5
Very uninterested	Uninterested	Neither interested nor uninterested	Interested	Very interested

3. An exhibit that gives a realistic 360 degree view of environments or scenes, such as a space shuttle or a nuclear disaster site

1	2	3	4	5
Very uninterested	Uninterested	Neither interested nor uninterested	Interested	Very interested

4. An app that sends additional information to your smartphone about the exhibit that you are currently viewing

1	2	3	4	5
Very uninterested	Uninterested	Neither interested nor uninterested	Interested	Very interested

5. Following a link on a mobile device (either your own or one provided by the museum) to a self guided audio tour of the museum

1	2	3	4	5
---	---	---	---	---

Very
uninterested

Uninterested

Neither
interested nor
uninterested

Interested

Very
interested

Appendix C: Visitor Observation Survey

The observation survey will be filled out electronically on SurveyGizmo for easier data analytics. The image below shows all the question we will be answering.

Observation Survey					
Gender (circle one):		Approx. Age (circle one):			
Male	Female	20-30	30-40	40-50	50-60 60+
Gallery (circle one):		Type of Device (circle one):		Gallery Density (circle one):	
Forest Gallery	Mind & Body	Bunjilaka	iPhone	iPad	Low
Dinosaurs	Evolution Gallery	Museum Cafe	Android phone	Android tablet	Medium
Children's Gallery	Te Pasifika	Foyer	iPod	Mp3 player	High
Geology Gallery	Marine Life	Bugs Alive			
Love and Sorrow (WWI)	Circulation Spaces				
Mobile Device Uses	Check if observed		Mobile Device Uses	Check if observed	
Texting			Instagram		
Taking Picture			Snapchat		
Recording Video			Email		
Telephoning			Translation		
Internet			Other:		
Facebook			Other:		
Twitter			Other:		
Comments:					

Gallery Size Classification

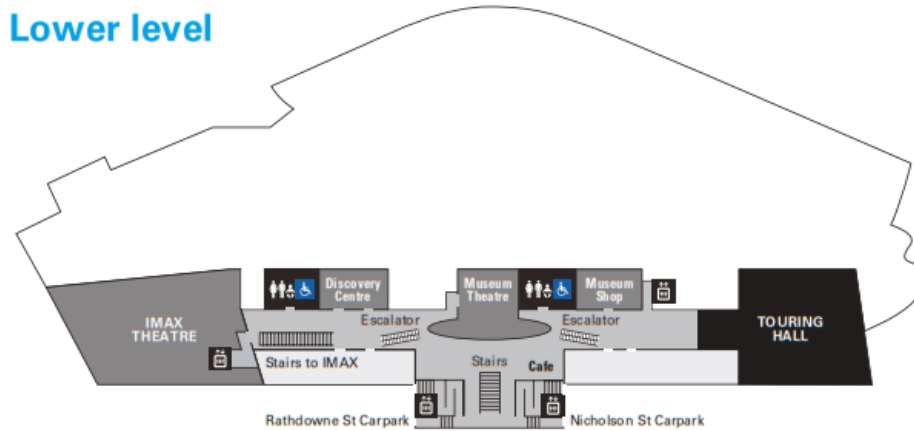
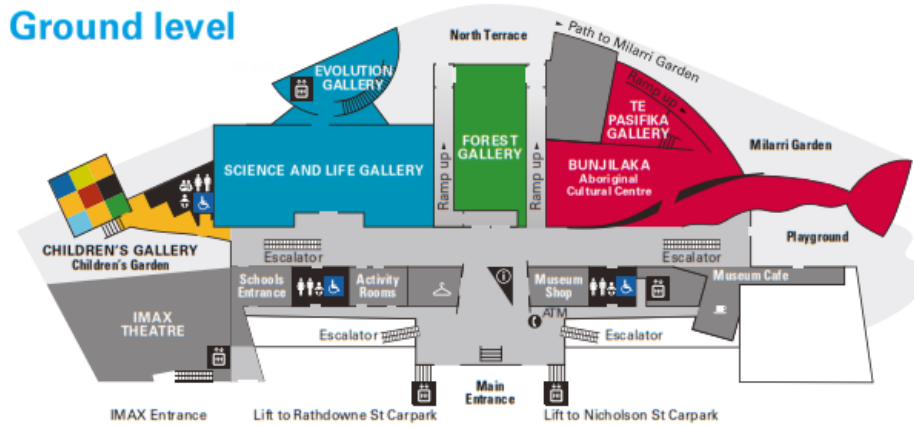
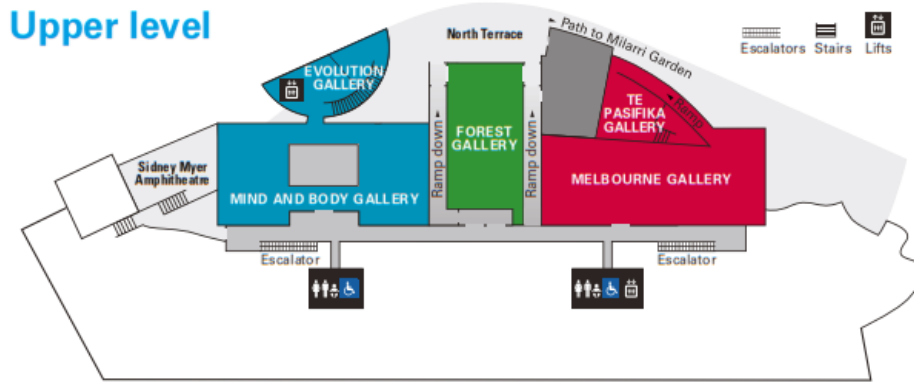
The below chart displays how we categorized gallery densities based on the physical exhibition space and the number of visitors in the gallery at the time of observation.

Density	Size of Location in the Melbourne Museum		
	Small	Medium	Large
Low	0-10 visitors	0-15 visitors	0-25 visitors
Medium	10-20 visitors	15-30 visitors	25-50 visitors
High	20+ visitors	30+ visitors	50+ visitors

This chart shows the breakdown of gallery sizes used for our observations.

Location in Melbourne Museum	Size of Location
Bugs Alive	Small
Bunjilaka	Medium
Children's Gallery	Large
Circulation Space	Medium
Dinosaurs	Medium
Evolution	Medium
Forest Gallery	Medium
Foyer	Large
Geology	Small
Marine Life	Small
Melbourne Story	Large
Mind and Body	Small
Museum Cafe	Medium
Te Pasifika	Medium
WWI (Love and Sorrow)	Small

Appendix D: Melbourne Museum Map



(Leslie, 2001)

Appendix E: Visitor Observation Data from SPSS

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	66	6.6	32.5	32.5
	Female	137	13.7	67.5	100.0
	Total	203	20.3	100.0	
Missing	System	797	79.7		
Total		1000	100.0		

Approximate Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-29	64	6.4	31.5	31.5
	30-39	79	7.9	38.9	70.4
	40-49	31	3.1	15.3	85.7
	50-59	20	2.0	9.9	95.6
	60+	9	.9	4.4	100.0
	Total	203	20.3	100.0	
Missing	System	797	79.7		
Total		1000	100.0		

Gallery					
		Frequency	%	Valid Percent	Cumulative Percent
Valid	Bugs Alive	13	1.3	6.5	6.5
	Bunjilaka	8	.8	4.0	10.4
	Children's Gallery	26	2.6	12.9	23.4
	Circulation Spaces	22	2.2	10.9	34.3
	Dinosaurs	48	4.8	23.9	58.2
	Evolution Gallery	18	1.8	9.0	67.2
	Forest Gallery	12	1.2	6.0	73.1
	Foyer	25	2.5	12.4	85.6
	Marine Life	5	.5	2.5	88.1
	Melbourne Story	6	.6	3.0	91.0
	Mind & Body	11	1.1	5.5	96.5
	Museum Cafe	4	.4	2.0	98.5
	Te Pasifika	3	.3	1.5	100.0
	Total	201	20.1	100.0	
Missing	System	799	79.9		

Type of Mobile Device				
		Responses		Percent of Cases
		N	Percent	
typeofdevice	iPhone	150	73.5%	73.9%
	Android Phone	50	24.5%	24.6%
	iPad	4	2.0%	2.0%
Total		204	100.0%	100.5%

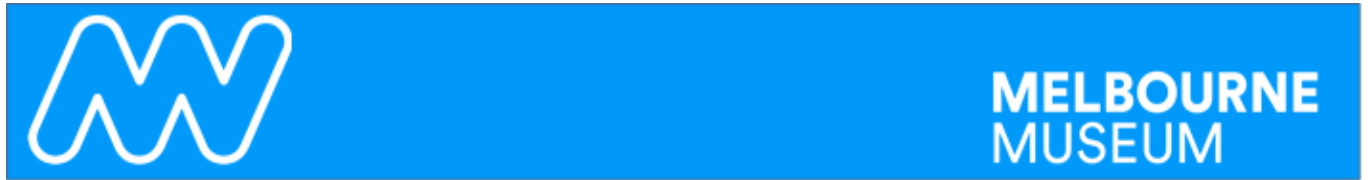
Density					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	86	8.6	42.4	42.4
	Medium	77	7.7	37.9	80.3
	High	40	4.0	19.7	100.0
	Total	203	20.3	100.0	
Missing	System	797	79.7		
Total		1000	100.0		

Device Uses				
		Responses		Percent of Cases
		N	Percent	
deviceuse	Texting	33	14.9%	16.3%
	Emailing	3	1.4%	1.5%
	Taking pictures	104	46.8%	51.2%
	Recording video	5	2.3%	2.5%
	Telephoning	19	8.6%	9.4%
	Internet	14	6.3%	6.9%
	Facebook	5	2.3%	2.5%
	Twitter	1	0.5%	0.5%
	Instagram	9	4.1%	4.4%
	Snapchat	6	2.7%	3.0%
	Translation	4	1.8%	2.0%
	Watching a video	2	0.9%	1.0%
	Video calling	2	0.9%	1.0%
	Game	4	1.8%	2.0%
	Instant Message	5	2.3%	2.5%

	Dating app	1	0.5%	0.5%
	Looking at pics	1	0.5%	0.5%
	Directions	1	0.5%	0.5%
	Reading messages	1	0.5%	0.5%
	Music	1	0.5%	0.5%
	Calculator	1	0.5%	0.5%
Total		222	100.0%	109.4%

Picture Subjects				
		Responses		Percent of Cases
		N	Percent	
Pic subject	Dinosaurs	24	22.0%	25.0%
	Bugs	9	8.3%	9.4%
	Family members/significant others	26	23.9%	27.1%
	Rocks	5	4.6%	5.2%
	School group	6	5.5%	6.3%
	Forest	7	6.4%	7.3%
	Animals	17	15.6%	17.7%
	Wall/ceiling art	6	5.5%	6.3%
	Melbourne Story	2	1.8%	2.1%
	Selfie	3	2.8%	3.1%
	Mind & Body	2	1.8%	2.1%
	Te Pasifika	1	0.9%	1.0%
	Marine Life	1	0.9%	1.0%
Total		109	100.0%	113.5%

Appendix F: Visitor Observation Data Summary to Museums Victoria



MUSEUMS VICTORIA | Melbourne Museum | Audience Insights

Observation of Mobile Device Use

REPORT NO.

SURVEY PERIOD: 9-13 NOVEMBER 2017 | RESPONDENTS: 203 | METHOD: OBSERVATION OF VISITORS USING MOBILE DEVICES

Summary:

Females were observed more frequently than males using their mobile devices. 67.5% of subjects observed were female and 32.5% were male.

Approximate age of observed subjects was recorded, with 70.4% falling between 20 and 39 years old and 38.9% of those coming from the 30-39 age group.

The gallery the visitor was in while using the mobile device was recorded. The most active gallery for mobile device use was the Dinosaur gallery, making up 23.9% of the total observations recorded. The foyer and other circulation spaces combined for 23.3% of observations.

The specific type of mobile device that the visitor used was recorded. The majority of visitors were observed using iPhones (73.5%) and overall 98% of visitors were using a smartphone of some kind, rather than a tablet.

The density of the gallery at the time of the visitor's mobile device use was noted. Galleries with lower densities tended to have more device usage with 42.4% of observations occurring in low density galleries and 37.9% occurring in medium density galleries.

A very large proportion of visitors (46.8%) were observed taking pictures. The second most popular activity was text messaging (14.9%).

If the visitor was observed taking a picture, then the subject of the picture was noted. The most popular subjects of photos were family members or significant others (23.9%), the dinosaurs (22.0%), and animals (15.6%).

1. Gender

Male	32.5%
Female	67.5%

2. Approximate Age of Observed Visitors

20-29	31.5%
30-39	38.9%
40-49	15.3%
50-59	9.9%
60+	4.4%

3. Visitor Location During Observation

Dinosaurs	23.9%	Mind & Body	5.5%
Children's Gallery	12.9%	Bunjilaka	4.0%
Foyer	12.4%	Melbourne Story	3.0%
Circulation Spaces	10.9%	Marine Life	2.0%
Evolution Gallery	9.0%	Museum Cafe	2.0%
Bugs Alive	6.5%	Te Pasifika	1.5%
Forest Gallery	6.0%	Love and Sorrow	0.5%

4. Observed Devices Used

iPhone	73.5%
Android Phone	24.5%
iPad	2.0%

5. Gallery Density

Low	42.4%
Medium	37.9%
High	19.7%

Observed Device Uses

Taking Pictures	46.8%	Translation	1.8%
Text Messaging	14.9%	Email	1.4%
Telephoning	8.6%	Watching a Video	0.9%
Internet	6.3%	Video Calling	0.9%
Instagram	4.1%	Dating Apps	0.5%
Snapchat	2.7%	Getting Directions	0.5%
Instant Messaging	2.3%	Listening to Music	0.5%
Recording Video	2.3%	Looking at Pictures	0.5%
Facebook	2.3%	Reading Messages	0.5%
Game	1.8%	Twitter	0.5%
		Calculator	0.5%

6. Subjects in Visitor Photos

Family Members/Significant Others	23.9%
Dinosaurs	22.0%
Animals	15.6%

Bugs	8.3%
Forest	6.4%
School Group	5.5%
Wall/Ceiling	5.5%
Rocks	4.6%
Selfie	2.8%
Mind & Body	1.8%
Melbourne Story	1.8%
Te Pasifika	0.9%
Marine Life	0.9%

Appendix G: Complete Data from Exhibit Interest Rating Exercise

QR Code: Age Group vs. Rating Given (Percentages)

Age (Years)	1	2	3	4	5	Total
18-29	16.90%	20.30%	22.00%	32.20%	8.50%	100.00%
30-39	25.00%	35.70%	7.10%	21.40%	10.70%	100.00%
40-49	10.50%	15.80%	26.30%	21.10%	26.30%	100.00%
50-59	14.30%	21.40%	0.00%	21.40%	42.90%	100.00%
60+	23.30%	26.70%	10.00%	26.70%	13.30%	100.00%

Augmented Reality: Age Group vs. Rating Given (Percentages)

Age (Years)	1	2	3	4	5	Total
18-29	1.70%	6.80%	8.50%	27.10%	55.90%	100.00%
30-39	0.00%	14.30%	3.60%	35.70%	46.40%	100.00%
40-49	10.50%	15.80%	5.30%	47.40%	21.10%	100.00%
50-59	14.30%	14.30%	35.70%	0.00%	35.70%	100.00%
60+	13.30%	16.70%	6.70%	46.70%	16.70%	100.00%
					% of 18-39 y/o who said 5	52.90%
					% of 40+ y/o who said 4/5	58.70%
					% of 40+ y/o who said 5	22.20%

Virtual Reality: Age Group vs. Rating Given (Percentages)

Age (Years)	1	2	3	4	5	Total
18-29	0.00%	5.10%	6.80%	39.00%	49.20%	100.00%
30-39	3.60%	10.70%	7.10%	42.90%	35.70%	100.00%
40-49	10.50%	15.80%	0.00%	31.60%	42.10%	100.00%
50-59	7.10%	14.30%	0.00%	50.00%	28.60%	100.00%
60+	6.70%	3.30%	10.00%	43.30%	36.70%	100.00%
					% of 18-39 y/o who said 5	44.80%
					% of 40+ y/o who said 4/5	77.80%
					% of 40+ y/o who said 5	36.50%

Bluetooth Beacons: Age Group vs. Rating Given (Percentages)

Age (Years)	1	2	3	4	5	Total
18-29	8.50%	23.70%	18.60%	39.00%	10.20%	100.00%
30-39	14.30%	32.10%	3.60%	28.60%	21.40%	100.00%
40-49	10.50%	5.30%	0.00%	52.60%	31.60%	100.00%
50-59	7.10%	28.60%	14.30%	42.90%	7.10%	100.00%
60+	30.00%	23.30%	10.00%	23.30%	13.30%	100.00%

Audio Tour: Age Group vs. Rating Given (Percentages)

Age (Years)	1	2	3	4	5	Total
18-29	11.90%	16.90%	22.00%	35.60%	13.60%	100.00%
30-39	0.00%	7.10%	17.90%	53.60%	21.40%	100.00%
40-49	15.80%	10.50%	0.00%	47.40%	26.30%	100.00%
50-59	14.30%	14.30%	14.30%	7.10%	50.00%	100.00%
60+	26.70%	3.30%	3.30%	43.30%	23.30%	100.00%

Appendix H: Inside Out Evaluation by Audience Insights Team

MUSEUMS VICTORIA | Melbourne Museum | Audience Insights

Inside Out Audio Evaluation

Report No: 1092

**SURVEY PERIOD: NOVEMBER 2017 | RESPONDENTS: 4 GROUPS | METHOD:
FOCUS GROUP**

Who is it for?

The suggested audience is adult, there was some insistence that it was a young adult audience but there is capacity for older adult audiences to engage and enjoy the experience as there is sufficient variety in the experience.

There is a feeling some comments are inappropriate for children but some believe these would go over the top of children's heads.

Who they perceive the experience is aimed at will influence responses: 'if aiming it at kids then people like me won't come but if aiming it at adults then if a kid is in there then that would be okay.' The reality though is that if there are huge numbers of children how might that affect the experience.

Many see this as an evening experience and expect that the museum will deliver this.

What is it about?

It was about 'captured moments in time' – past, present and future. This is not realised at first but revealed as respondents go through the experience – 'a slow build' - and in their discussions afterwards. They 'get' it when talk about futurism towards the end of the experience. Once realised it is about time and are able to talk about, they could recall mentions and examples of the concept in the earlier sections of the experience.

The use of a cognitive organiser at the beginning will help 'set up' the experience and their expectations of it.

There is recognition that the objects represent the wide variety of objects in the museum's collection and that it starts with the message stick which is from a long time ago.

This experience is one that goes beyond the viewing and listening and onto the discussion with others afterwards, as with all the stimulus, respondents were not immediately clear on what it was they experienced – 'it hits you later'. There is a wealth of information and stimulation in the audio alone. Opportunities to foster discussion should be explored, especially in the immediate aftermath of the experience.

How do they feel?

There were feelings of confusion at the beginning of the experience as respondents yet to work out what it is about but by the time they get to the bird exhibit they started to relax and enjoy what they were hearing and let go and go along for the ride. There is a possibility that it will remain confusing for some – 'so far out that say 'Nah what is this?''

In many exhibits there is a strong connection between who the speaker is and what they are talking about, in others not so much so – bar, otter, bird. Sometimes, it didn't matter. That they

were all personal reactions to what was in the exhibits was the interesting bit for some. There is a strong need to know who the speaker is and their relevance to the objects/exhibit for others.

The primary narration is excellent. Need to know that Tanya is an astronomer – here credentials important to the story. Really enjoyed the voice of speaker of the tattoo (and was she also the one at the end talking about time?)

The humour broke up the storytelling in a good way. It was good. It was funny. It was sophisticated. There is a greater expectation of facts from a museum so use of humour is a change. Some of the jokes or clever plays on words/ideas were not always obvious and understood straightaway. But this is a strength. As on reflection and discussion with others, there is much to recall, to chuckle over and suddenly ‘get’.

The timing of the experience seems to be just about right –not too much, not too little information.

Does it make them think differently about the museum?

There is acknowledgment that it is a different kind of experience from what museums are known to provide.

‘. . listen, now move and do this, more listening and looking at stuff’.

‘Felt more like a series of short stories, like a weird film festival’ ‘

‘Surprised me as when I go to a museum I don’t read anything, and now this has nothing to read!’

‘Reminds me of Nocturnal . . if I had not done that (Nocturnal) I would have thought this is different. Nocturnal did change my idea of what the museum was like’

Some think that the lack of information might lessen the experience for them – *‘thought going to be more informative, instead more about people’s opinions and the experience of things’*

Others believe that in this day and age museums will provide experiences that are different as a matter of course, that it is a sign of the times and the world in which museums now operate.

Of interest was the question whether the experience made people like museums more. Those who already liked museums thought they would be attracted to the experience but that they would just continue to like museums. Whereas the experience has the potential to change the opinion of those who don’t like museums.

‘If you didn’t love museums already, it would probably attract your attention more but not change your perception’

‘I really hate rocks and mineral but I found that (the bar) very interesting’

What’s missing?

They thought the idea behind the experience was ‘cool’ but there was also an expectation of information on each of the objects, particularly those that attracted their attention but were not on the audio. Many suggestions were provided: website, pamphlets, labels, taking photos, ‘take a record’ on the device and QR codes.

There was a mixed response as to when they would/could access this additional information. Some said they needed the information to be available as part of the experience as would ‘forget

to look it up once at home. Others were happy to just have the information and thought they would access it when convenient.

The suggestion to extend the experience outside the TH space and allow time to access information outside was thought to be credible. Some suggested a large 'fancy' QR code at the end in keeping with the spirit of the experience placed which they could then access information using their own device. The proposed process to push a link to their own email/text would address their needs at this point.

It is unclear at which point they would surrender the fleet device. They suggested that 'being able to do what we doing now (talking about the experience) within the space' would be enjoyable. They suggested they would want to do it pretty soon afterwards – 'like the idea of it finishing but being able to stay in same space and looking further.'

Issue is the nature of the information being provided. If there is no intention to have additional information in the experience and the detailed information that is of interest would be too big to be accommodated, how do you create the link between the visual object to the written information – cannot search by image so therefore how to do this?

An additional question they had was why these objects were selected rather than other objects.

What will they pay?

\$10 excellent – don't think about it. \$20 would make stop and think about it, would need to know what it is.

The beginning

There is some uncertainty as to where to start the experience. Expect with infrastructure such as desks etc., certainty would be given. Temptation is to go to the doors in first instance. In the commentary a message such as 'let's linger here before we do in' might be appropriate. CSOs will need to stagger entry to avoid 'clumping' at exhibits.

Similarly, how syncing with others will affect the experience is not fully understood – need to know that must stay together that all would get the one audio information regardless of location of the individual. They really liked having someone to go around with, that they all reacted at the same time, at the same jokes, especially cool for listening to the music together and dancing. However, not sure if can take photos or whether can text each other – need to be clear.

Necessary information: short description of experiences eg. 'Take a journey into the past, present and future'. A teaser, must be short, must match the 'quirkiness' of inside.

The four invitations are:

- Do you want to go around with others?
- Do you want to take photos?
- Do you want to use your own device?
- Do you want to use a museum device?

Each of these would be followed by the instructions to ensure they can happen effectively. Questions about the device include - Can pause /skip/rewind audio (can you on fleet device), can

take photos (can you on fleet device), can text message (can you on fleet device). Permission for photographs also need to be clear.

Check mention of 'blue' or 'daylight' sky in audio as won't be accurate if open at night.

Walking stick

This exhibit was little mentioned but some liked that an Aboriginal object was the first one inside the room.

Sad otter

The story was about a 'tattoo, of a drawing, of a thing', which made the story different. That they did not get to see the tattoo when it was the primary focus of the story was disappointing for some. The story was also for some a mismatch with expectations, possibly as it was early on in the experience and so they did not know what to expect but also the nature of the story seemed disconnected from the objects viewing. It was not directly about the object there was a step between the story and the object. The story also seemed long.

It would be important for this exhibit, the preceding one and the one to follow to ensure that they are potent as people are still trying to work out what the heck the experience is all about.

Currently, these three do stand out as being a bit different from other exhibits as the connection between speaker and story is perceived as not strong.

Bar

There were mixed responses to this exhibit. For some it was their favourite as they found the story including the jokes and word plays were engaging. They also thought that it introduced elements of the Melbourne pub scene into the experience.

For others, there is a lack of understanding as to why the barman is there and what connection he had to the objects, similar to the otter story. Older respondents found it tedious.

Elements of the story had double meanings e.g. lines. But essentially seen as clever although perhaps not appropriate to be talking about nor for all audiences.

Technical issues such as the audio skipping and the robotic voice were noted.

The most positive response 'I really hate rocks and minerals, but I really found that (story) interesting.'

Dress/birds/cage

This was a favourite for some, again a bit of culture injection from the Melbourne scene – apparently Australia has more drag queens than the US. There was a moment of confusion when introduced to Doreen and then heard a man's voice, but the penny dropped quickly. For some, the segway from dress, to drag queen, to dance, to getting photo taken was brilliant as it made so much sense, the individual did not need to think who was talking or why they were seeing this. This section of the experience is strong and engrossing.

There were some who stayed longer at the bird as not told to move to the cage and so felt that the 'bird' exhibit was too long. If they had moved earlier this would not have been the case.

Once in the cage (which is a key exhibit), the dancing was liked by most who all felt they would do it when the environment was more conducive to it, especially if in sync with others. However, some did not like the dancing and skipped the music saying ‘nah, I am out of here’.

There was a sudden transition to talking about the camera on the audio whilst they were still in the cage. Getting the timing and directions right here is important.

Camera

There was interest in this exhibit but some disconnect between what talking about and what seeing, similar to the otter exhibit. Here there were objects of interest that were not spoken about in the audio.

Taxidermy

Again, here were objects of interest that were not spoken about in the audio e.g. ‘hamster with teeth’. Some wanted to access further information about these objects and those in other exhibits. There were requests for labels with ‘small’ amounts of information but also a recognition that is not in keeping with experience. Some thought they would take photos but this information is not the kind that would allow them to search online for the objects and find it. Additionally, some need to be clearly told that it is okay to take photos if they can.

Hearse and choral

This section of the experience was rushed, incomplete and confusing. There was no wayfinding information to assist movement through the area. There was not enough time nor an invitation to walk around hearse before starting to talk about choral. Some felt the coffin was very informative but the phrase ‘can’t quite nail you down’ was not understood until later (when they got the connection). They literally thought that they were being tracked like Google map! Many missed the moth story.

If the proposed transitioning is in place, it will alleviate many of the problems in this and other areas of the experience. The transitions are very important to keep the flow and, of particular importance, is the introduction at each exhibit. It needs to be memorable in a way that makes them pay attention to it as there will be many competing stimuli shouting for their attention and they may miss necessary information such as who is the speaker or why they are speaking.

Polar bear

There was some confusion as to what to do here – wait or go in. There is no information nor clues to help. Being told ‘while you wait’, made them think they needed to wait but not sure that they really had to. Envisaged that when the whole experience is available, there would be visual clues to assist decision making.

The audio also kept going and told them to go to the crash scene before they were ready to move on. The music between this and crash exhibit was also a sharp contrast.

This is the place where you are more likely to be conscious of other people as lining up and it is a small space. This will be a key exhibit as many will want the selfies. However, will this be a bottleneck? Can/will they move onto crash site and come back? Will the device allow it?

A little confusion when the same voice from the camera exhibit came on – some had not heard the reference in the camera exhibit that would hear from him again so thought the audio had a glitch.

Cash site/mirror

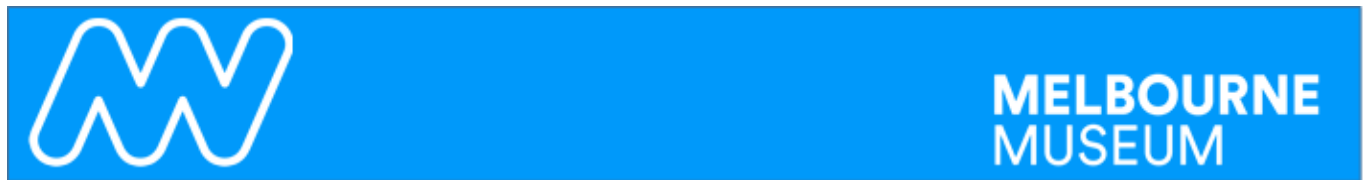
The expectation is that this will be very visually appealing and it is here where the talk of past and future became clear. A greater complexity of time eg nanoseconds, stretched time, paused time, etc., added interesting layers. Tanya's credentials are necessary given the nature of this information. A significant object is the mirror: that it belonged to a telescope and its positioning opposite the crash site.

It is at this point that the unusual/ unexpected nature of the information in the experience is reinforced e.g. the picnic table. They are really enjoying themselves at this point.

Ending

Music got really loud at the end and hard to listen to woman's voice, hard to hear. When synced may be at end but if partner behind than may never get to end.

Appendix I: Exit Survey Data Summary to Museums Victoria



MUSEUMS VICTORIA | Melbourne Museum | Audience Insights

Mobile Device Interviews

REPORT NO.

SURVEY PERIOD: 3-21 NOVEMBER 2017 | RESPONDENTS: 150 | METHOD: EXIT INTERVIEWS

Summary:

Questions with an (a) after the question number denote that it was only asked to visitors who did not own a mobile device. Only 2 visitors to the museum did not own a mobile device so it is difficult to draw any general conclusions from just those 2 responses.

Questions with a (b) after the number represent the questions asked to those visitors who own a mobile device.

Questions with a (c) after the number represent the questions asked to visitors who did not bring their mobile device to the museum on the day of their visit.

Questions with a (d) after the number denote the questions asked to visitors who owned a mobile device and brought it with them to the museum.

Questions with an (e) after the number represent the questions asked to visitors who used their mobile device during their visit.

Questions with an (f) after the number represent the questions asked to visitors who did not use their mobile device during their visit.

Any question with percent of cases stated after the question means that participants had the option to answer multiple responses to those questions and the percentage shown is according to the percent of participants who answered that option regardless of their other answers to that question.

The n value reported next the question is the total number of responses to that question which includes all answers to questions with multiple possible responses.

A vast majority of visitors reported owning a mobile device (98.7%).

Of those that did not own a mobile device, their reasoning for not owning one was that the devices are too complicated or feel that they do not need one. However, both participants felt that mobile devices make a person's life easier.

For participants who did own a mobile device, 61.5% of them owned an iPhone while 39.2% owned an Android Phone, and 14.9% owned iPads.

96.6% of participants who owned either an iPhone or Android Phone brought it with them to the museum while only 9.4% of participants who owned an iPad brought it to the museum.

Of the four participants who did not bring their devices to the museum 50% forgot it at home, and all of which agreed that if they had brought their mobile device it would not have enhanced their visit.

Upon arrival to the museum only 45.1% of visitors expected to use their device in some way but 71.6% of visitors ended up using their device.

The most reported mobile device use by visitors was taking pictures (68.6%), followed by texting (35.3%) and telephoning (18.6%).

Of the 102 visitors who used their mobile device 44.1% said their use was related to the museum, 35.3% thought that it was unrelated, and 20.6% reported using their device for both related and unrelated reasons.

The majority of visitors were taking photos, so the subject of the photos was inquired about and a large proportion of these pictures were taken of the dinosaurs (35.6%), animals (22.2%), and in the forest gallery (20.6%).

51% of visitors reported that using their mobile device added to their visit in some way. The top reasons for this enhancement was the memories they can look back on because of the pictures (58.8%), the fact that they enjoy taking pictures (39.2%), and also to share exhibits or info with others (21.6%).

For those who did not use their mobile devices during their visit their three biggest reasons for not doing so were that they didn't want to be distracted (30.2%), they felt there was no need to use it (27.9%), and that they didn't feel it was appropriate to use in the museum (20.9%).

A majority of 64.3% of participants reported that they felt that using their mobile device would not enhance their visit in any way.

For those visitors who did think that it might have enhanced their visit if they used their mobile device, they said that getting more information (50%) and taking pictures (25%) would be the greatest reasons for that enhancement.

57.1% of participants said that they would be willing to use their mobile devices if there was a museum exhibit specifically designed for mobile device use.

Of the 31.1% of participants who reported that they would not being willing to use their mobile device at an exhibit specifically for mobile device use 28.6% of visitors thought it would be too challenging to experience the exhibit in this way and 14.3% of respondents wanted to concentrate on the exhibits as well as 14.3% having no interest in participating in the exhibit.

According to the results from the exhibit rating exercise, Augmented and Virtual reality were the most popular experiences according to respondents.

Most visitors came to the museum with their partner/spouse (42.3%), alone (26.2%) or with adult friends (20.8%).

42% of participants were foreign visitors from other countries and 39.3% of participants spoke another language besides English at home.

1. Do you own any Mobile Devices? (n=150)

Yes	98.7%
No	1.3%

2a. Why do you not own any of these devices? (n=2)

Too Complicated	50%
Don't Need One	50%

3a. What do you use to contact people, get information and entertainment? (percent of 2 cases) (n=5)

Television	50%
Radio	50%
Book	50%
Landline	50%
Tablet	50%

4a. Do you think having these devices makes a person's life easier? (n=2)

Yes	100%
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5a. Why people without devices think they make people's lives easier (n=1)

Realize some people need them	50%
They are handy	50%

6a. If the museum were to provide one of these devices. Would you use one during your visit to the museum? (n=2)

Yes	50%
Not sure	50%

7a. Why people would use device provided

8a. Why people aren't sure if they would

by the museum (n=1)		use a device provided by the museum (n=1)	
They are handy	100%	Only if it's easy and compact	100%

8b. What specific mobile device do you own? (percent of cases) (n=178)

iPhone	61.5%
Android Phone	39.2%
iPad	14.9%
Android Tablet	2.7%
Basic Cell phone	0.7%
2-in-1 Laptop/Tablet	0.7%
Apple Watch	0.7%

9b. Which of these devices do you have with you today at the museum? (percent of cases) (n=178)

iPhone	60.8%
Android Phone	36.5%
iPad	1.4%
Android Tablet	0.7%
None	2.7%

10c. Why didn't you bring your device in the museum? (percent of cases) (n=5)

Didn't want to be distracted	25%
Don't use it	25%
Forgot it at home	50%
Too heavy	25%

11c. If you had brought your device, do you feel it would've enhanced your visit? (n=4)

No	100%
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12d. When you arrived did you expect to use any of these devices during your visit? (n=144)

No	54.9%
Yes	45.1%

13d. How visitors expected to use their devices (percent of cases) (n=84)

Taking pictures	64.6%	Look up map of museum	6.2%
Telephoning	16.9%	Emailing	4.6%
Texting	13.8%	Connect to Wi-Fi	1.5%
Social Media	10.8%	Everyday things	1.5%
Internet	9.2%		

14d. Which device(s), if any, did you use during visit? (percent of cases) (n=144)

iPhone	47.6%
Android Phone	23.8%
Apple Watch	0.7%

Didn't use devices 28.7%

15e. How did you use your device(s) during your visit? (percent of cases) (n=188)

Taking pictures	68.6%	Navigation	3.9%
Texting	35.3%	Facebook	2.9%
Telephoning	18.6%	Connect to Wi-Fi	2%
Internet	16.7%	Track steps	1%
Emailing	10.8%	Snapchat	1%
Posting pictures to social media	8.8%	Scan QR codes	1%
Recording videos	3.9%	Updating apps	1%
Instant messaging	3.9%	Looking at time	1%
Unspecified use	3.9%		

16e. Would you say the use of your device was... (n=102)

Mostly related to the museum	44.1%
Mostly unrelated to the museum	35.3%
A little of both	20.6%

17e. What did you take a picture of? (percent of cases) (n=111)

Dinosaurs	36.5%	Live animals	7.9%
Animals	22.2%	Phar Lap	6.3%
Forest	20.6%	Geology	4.8%
Bugs Alive	14.3%	Marine Life	3.2%
Not sure which exhibit	12.7%	Wall/ceiling art	3.2%
Bunjilaka	11.1%	Eel feeding	1.6%
Te Pasifika	11.1%	Women in the land	1.6%
Melbourne Gallery	9.5%	Links for further research	1.6%
Kids/family	7.9%		

18e. Did using your device(s) add to your museum experience in any way? (n=102)

Yes	51%
No	47%
Not Sure	2%

19e. How did it add to your visit? (percent of cases) (n=74)

Memories	58.8%
Enjoyed taking pictures	39.2%
Share exhibits or info with others	21.6%
Looked up info	15.7%
Directions	5.9%
Communicating with others	3.9%

20f. Why didn't you use your device in the museum? (percent of cases) (n=57)

Didn't want to be distracted	30.2%	International phone	4.7%
No need	27.9%	Battery was dead	2.3%
Don't feel it is appropriate	20.9%	No service	2.3%

Came just for the museum	11.6%	Didn't want to use data	2.3%
Don't use it in general	7.0%	Didn't want to	2.3%
Had children to worry about	4.7%	With people they would contact	2.3%
Didn't think about using it	4.7%	Didn't want to distract others	2.3%

21f. If you had used your device(s), do you think it might have added to your visit? (n=42)

No	64.3%
Yes	21.4%
Not Sure	14.3%

22f. How device would've added to visitors' experiences (percent of cases) (n=9)

More information	50.0%
Take pictures	25.0%
Interactivity	12.5%
If there was an exhibit specific to mobile devices	12.5%
If there was an audio guide	12.5%

23f. Would you have used your device(s) if there were specific exhibits or activities that required their use? (n=42)

Yes	57.1%
No	31.0%
Not sure	11.9%

24f. Why visitors wouldn't use devices for exhibits requiring their use (n=14)

Too challenging	28.6%
Want to concentrate on exhibits	14.3%
No interest	14.3%
Prefer information to already be available	7.1%
Wants to get away from technology	7.1%
No experience with exhibits requiring their use	7.1%
Don't want to download an app	7.1%
Info was good enough at exhibits, no need	7.1%
No reason	7.1%

25f. Why visitors would use devices for exhibits requiring their use (n=19)

Didn't give a reason	26.3%	Likes interactivity	10.5%
Interested	21.1%	If it is a QR code	5.3%
For additional information	15.8%	If they knew how to use it	5.3%
If there are instructions	10.5%	Has used similar exhibits in the past	5.3%

26f. Why visitors were unsure if they would use devices for exhibits requiring their use (n=5)

Prefer not to use phone	20%	If free Wi-Fi is available	20%
Depends on ease of use	20%	Maybe in later visits	20%
Doesn't rely on phone	20%		

Exhibit Rating Exercise (n=150):

QR Code interest

Very interested	15.3%
Interested	26.7%
Neither interested not uninterested	15.3%
Uninterested	24.0%
Very uninterested	18.7%

Augmented Reality Interest

Very interested	40.0%
Interested	32.7%
Neither interested nor uninterested	9.3%
Uninterested	12.0%
Very uninterested	6.0%

Virtual Reality Interest

Very interested	41.3%
Interested	40.7%
Neither interested nor uninterested	6.0%
Uninterested	8.0%
Very uninterested	4.0%

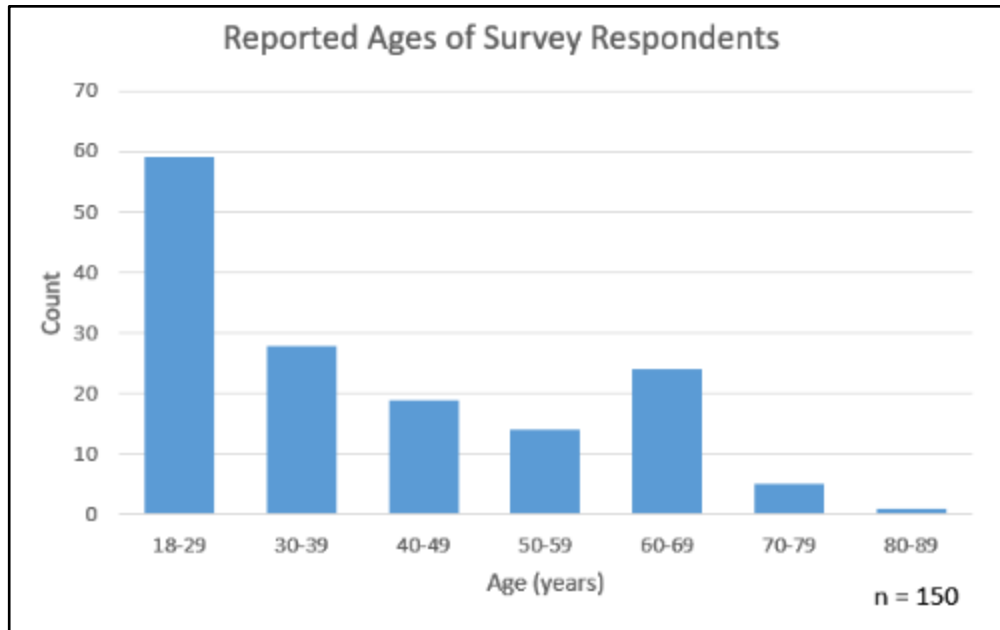
Bluetooth Beacon App Interest

Very interested	15.3%
Interested	38.0%
Neither interested nor uninterested	11.3%
Uninterested	23.3%
Very uninterested	14.0%

Audio Tour Interest

Very interested	22.0%
Interested	39.3%
Neither interested nor uninterested	14.0%
Uninterested	11.3%
Very uninterested	13.3%

What is your age? (n=150)



Who did you come to the museum with today? (percent of cases) (n=172)

With partner/spouse	42.3%
Alone	26.2%
With adult friend(s)	20.8%
With my child(ren)	14.1%
With other family members	11.4%
With school group (as chaperone)	0.7%

What gender do you identify as? (n=150)

Female	54.7%
Male	45.3%

At home do you speak another language besides English? (n=150)

No	64.7%
Yes	35.3%

Languages besides English spoken at home (percent of cases) (n=59)

German	18.9%	Arabic	1.9%
French	15.1%	Portuguese	1.9%
Mandarin	11.3%	Hebrew	1.9%
Italian	9.4%	Urdu	1.9%
Spanish	7.5%	Filipino	1.9%
Swedish	5.7%	Polish	1.9%
Cantonese	5.7%	American Sign Language	1.9%
Dutch	5.7%	Japanese	1.9%
Korean	3.8%	Vietnamese	1.9%
Greek	3.8%	Malay	1.9%
Finnish	3.8%	Thai	1.9%

Post codes of visitors (n=78)



Home countries of non-Australian visitors (n=72)

USA	22.2%	Holland	1.4%
United Kingdom	19.4%	Korea	1.4%
Germany	8.3%	Argentina	1.4%
New Zealand	6.9%	Switzerland	1.4%
Malaysia	5.6%	Austria	1.4%
Canada	5.6%	Netherlands	1.4%
France	4.2%	Ireland	1.4%
Sweden	2.8%	Turkey	1.4%
Singapore	1.4%	Vietnam	1.4%
Oman	1.4%	Hong Kong	1.4%
Israel	1.4%	United Arab Emirates	1.4%
Poland	1.4%	Greece	1.4%
Italy	1.4%	Finland	1.4%