Project Number: KYO3

Market Testing Kyoto VR's Audio Guide Application

An Interactive Qualifying Project Report:
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WORCESTER POLYTECHNIC INSTITUTE
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Degree of Bachelor of Science
by

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Approved:

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Abstract

Kyoto VR is an immersive media company in Kyoto, Japan. They are building an Augmented Reality Travel Platform to provide on-demand audio tours and immersive experiences for travelers in Japan. We will be conducting on the ground research with travelers to identify obstacles to the adoption of this audio guide in Kyoto. Our research methods will include conducting interviews and surveys with the travelers to gain insight to what they think of the product. Once all data is collected we will be developing recommendations for Kyoto VR that will improve their product and help it to be successful when it is launched in 2019.

Acknowledgements

We would like to thank everyone who aided the development of our project. First, we would like to thank our project sponsor Kyoto VR for providing us with this project and for their continued support during our stay in Kyoto. We would also like to thank Yokai SOHO for providing us with accommodations for our stay in Kyoto. Specifically, we would like to thank Professor John F. Zeugner for his support and guidance during the preparation term for the project. We would also like to thank Professor Jennifer deWinter, our on-site advisor, for her guidance throughout the project. Furthermore, we would like to thank the Research and Instruction Librarians, Jessica O'Toole and Lori L. Steckervetz for their help with the background research and APA citations. Next, we would like to thank William D. Wallace and Vanessa Bumpus from the Worcester Historical Museum and the staff at the Worcester Art Museum for their help with research into audio guides. We would also like to thank professor Soussan Djamasbi for her input on user experience testing. Finally, we would like to thank Worcester Polytechnic Institute for providing us with this opportunity.

Authorship Page

Henry Frishman performed background research on audio tours. He also performed half of the research towards proper interviewing. Henry organized the whole background. This included piecing together his research with others, complete editing of the background for each draft, and reading through the paper in its entirety to verify the necessity and validity of each piece of research. For the methodology, Henry wrote sections 1-3 and 5, analyzing and assessing all of the group's background research to create the methods and the reasoning behind them. He then edited the document. He performed background interviews for the research regarding audio tours and created their write ups.

Olivia Hanson performed research on survey and interview methods. She also looked into analyzing data from focus groups. In addition, Olivia took Worcester's Canal District Audio Tour as part of the background research for audio tours. She also did work on the methodology and acknowledgments pages as well as doing some editing on the background research paper.

Faith Kurtz completed all of the background research on user profiles, including behavioral archetypes and user personas. She researched existing methods for creating user profiles and created the full method which will be used for this project. She also created interview and survey questions for users, as well as methods for analyzing the data collected. Faith also completed background research on existing audio tours and audio tour evaluation methods. She performed an interview as background research for audio tours. She also conducted an interview for research on user experience testing and created the write up. In addition, she organized and edited the background and the methodology, and edited the bibliography and citations.

Anthony Marge performed background research on tourism in Japan and tourism statistics. He also researched user experience testing and developed the usability methods. He participated in the Worcester Art Museum's audio guide evaluation. He also did work on the methodology as well as doing some editing on the background research paper.

Manas Mehta did background research on past IQPs to get content on audio guides and research methods. He also worked on the methodology, specifically the section on evaluating data. Additionally, he designed the consent forms and the questionnaires used throughout the project. Furthermore, he participated in the Worcester Art Museum audio guide evaluation and researched on the features of an effective presentation. Moreover, he named all the figures and compiled them in the Table of Figures. He also designed the Title Page and the Acknowledgments page, and assisted in editing and compiling the project report and the proposal presentation.

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Chapter 1: Introduction

Traditionally, tours are done in person or by way of map. With the creation of audio tours we have ways to allow everybody to easily take the same tour, and to do it by themselves. Audio guides come in a many different forms. They can be in the form of an electronic multimedia guide, which is a device designed to provide audio content to museum visitors without much user interaction. These guides often use accessories such as headphones and LCD screen displays. They operate in many different ways. For example, one museum may use location aware systems that can operate somewhat automatically while another museum may use a device that requires the user to go through the museum exhibits in a specific order.

Figure 1: Audio Conexus Audio Guide Wand (Audio Conexus, 2018)

Another form of audio guide is through the use of a user's smartphone. The user may access the content either through a website on an internet browser or download an app. Those tours are often the ones that users can pause and go through more at their own pace. For example if a user were to come across a location or exhibit that interests them, they would be able to pause to appreciate it for longer than another exhibit that they might not be as interested in. These phone based tours will also often incorporate the smart phone's built in GPS system to locate the user and automatically provide information based on their location.

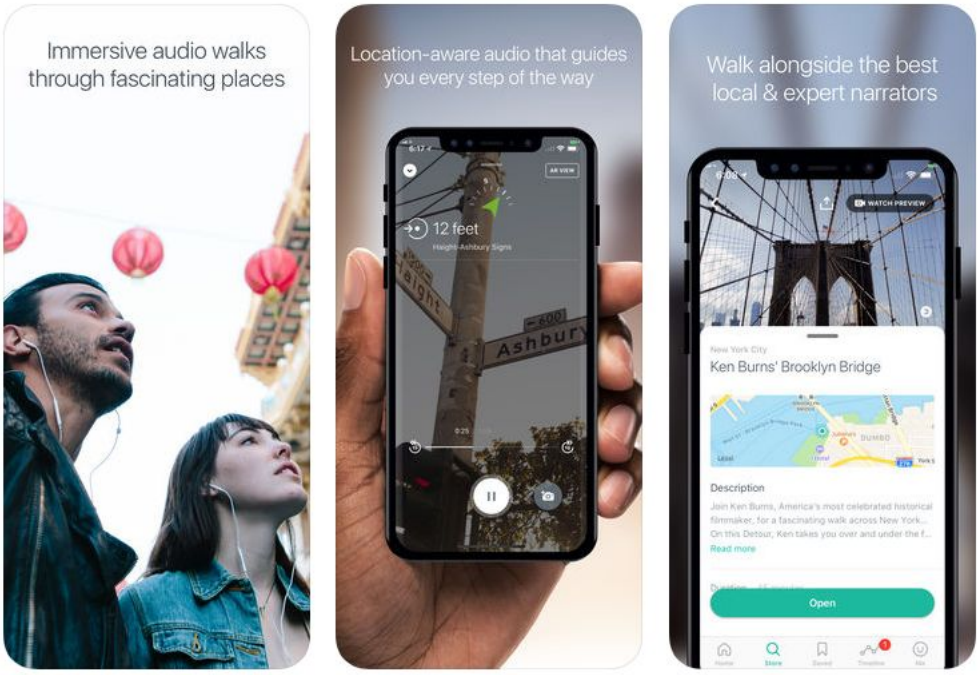


Figure 2: Detour - Guided Walking Tours (Worldwide Insure, 2018)

Audio tours also have their downfalls when compared to guided tours. When taking a guided tour, there is often an overarching story to the narrative. Guides know how to tell the story and keep their tourist's attention. They make the tour fun and exciting, something that audio tours can have trouble with. Because of the flexible and self-guided nature of audio tours, they usually lack an overarching narrative, causing each part of the tour to feel separate. Creating an overarching narrative drives usage of the tour, as it places the user within a story creating a sense of excitement. It is also important to make sure that the narrative is not just the narrator droning on about the history of a topic. There should also be parts to lighten the mood and keep the user interested such as jokes, similar to as if a guide were making a joke in a tourist group.

Kyoto VR is currently creating and testing a new audio guide for Kyoto, Japan. They are currently building an Augmented Reality Travel Platform that will provide tourists in Kyoto on-demand audio tours and immersive experiences. Kyoto VR's audio tour will enable English speaking tourists to guide themselves throughout Kyoto without the need for a translator. However, this tour has yet to be tested, and it is the first audio tour developed by Kyoto VR.

While we are in Kyoto, we will be to evaluating and gather feedback on the audio guide in order to develop recommendations for Kyoto VR on how to improve their product. We will also be gauging interest from both tourists and citizens of the city's along with willingness to pay for the use of this product. As external consultants, we will be properly identifying and recommending how to overcome obstacles for Kyoto VR in our final presentation and report.

Chapter 2: Background and Literature Review

Kyoto VR is currently building an Augmented Reality Travel Platform that will provide tourists in Kyoto on-demand audio tours and immersive experiences. Unfortunately, there has yet to be information gathered that identifies obstacles to the adoption of this Audio Guide in Kyoto. While we are in Kyoto, our goal will be to evaluate and gather feedback on the audio guide in order to develop recommendations for Kyoto VR to improve their product. Part of our goal will also be to gauge interest from both tourists and citizens of the city and to measure their willingness to pay for the use of this product. As external consultants, our goal is to properly identify and recommend how to overcome obstacles for Kyoto VR in our final presentation and report.

2.1 Audio Tours

First and foremost, an audio tour needs to be both fun and exciting. Users not only wish to know the meaning significance behind what they are looking at, but for those messages to be delivered to them in an interesting way (Mann & Tung, 2015, Section 7, Huddleson 2017). An audio guide needs to tell a story. Because of the flexible, self-guided nature of audio tours, they usually lack an overarching narrative. Each part of the tour feels separate. Creating an overarching narrative drives usage of the tour, as it places the user within a story creating a sense of excitement (Huddleson 2017). Another way to enhance the enjoyment of an audio tour involves galvanizing the delivery of the content. The way in which an audio tour is narrated is equally important as the content the narration is delivering. Giving the narrator of the tour a chipper attitude while including jokes and fun anecdotes can easily increase the desirability of the tour (Appendix D; Appendix B). Finally, the length of the tour has a large impact on both what the tourist learns and whether they choose to take the tour in the first place. Time constraints, or boredom, or unsuitable weather can affect a tour's success. In addition, it is important for a tourist to simply know the length of the tour beforehand, preferably in the description for it.

In order to draw in the most users, an audio tour needs to be inclusive to everybody. This (Appendix D; Appendix B**)**. Since many tourists travel in families with children and grandparents. To account for this, there are a few techniques to appeal to all age groups. Younger audiences are more inclined to participate in a tour if there are interactive components such as audio, video, photos, etc. (Carbonell, 2011). Including fun anecdotes and reoccuring themes can also be appealing to a younger user who may not have a consistent attention span.

Figure 3: Family Guide - Interactive element of the self-guided tour for kids (Worcester Art Museum, 2018)

For older audiences, it is important for the tour to be easily usable and be at least reminiscent of a guide-led tour. This means including a lot of direction for the tour and using land markers or even permanent signage, directing you to the next area (Luga et al., 2016, Background, p.14). Overall, a mix of mediums is important because it guarantees that the tour will reach the widest possible audience. Everyone has a preference on how they best like to learn, therefore tailoring the tour to a few different mediums, such as verbal, audio, visual, and kinesthetic, is important because it gives users a choice (Luga et al., 2016, Conclusions and Recommendations, p. 49-50). It is important for the tour to be clear and concise. While self-guided tours around a site allow tourists more freedom, there is also the chance of misinformation or misinterpretation of the presented information, which could be caused by unclear signage or complex wording. We have to realize that not every tourist will have the same educational background or understanding of the sites as the writers of the tour material (Luga et al., 2016, Background, p.12). Consequently, self-guided tours must be accessible to a wide range of individuals (Thomson, 1996; Luga et al., 2016, Background, p.12; Appendix D; Appendix B). When thinking about people with different technological capabilities, it is incredibly important for the tour's digital interface to be intuitive especially for those over the age of 40 (Hudelson, 2017).

A large benefit to a digital tour is that it is easily updatable. It is *incredibly* important that the content of the tour is both accurate and up to date (Luga et al., 2016, Background, p.14;

Appendix D; Appendix B**)**. These accuracies and updates include fixing any broken links, adjusting the audio based on user feedback, and clarifying anything the tour users have found difficult to understand or unclear (Luga et al., 2016, Conclusions and Recommendations, p. 49-50). Keeping your audio tour consistently updated and accurate is key to the tour's survival, as it ensures the tour keeps up with competitors and stays well reviewed (Luga et al., 2016, Executive Summary, p. vi).

There are many things that can completely inhibit the proper use of an audio tour. For example having an unclear starting location. A clear starting location is incredibly important within an audio tour, in order to keep it easy to use and intuitive. It ensures a smooth beginning of the tour, and increases the likeliness of a customer using the tour (Hudelson, 2017). From there, it's incredibly important to have clear directions, both audio and visual based (text directions, maps, signs, etc) (Wissman, 2013, p. 597-598). Helping travelers navigate not only the sites of interest but also the paths between is crucial to having an effective guide (Wissman, 2013, p. 598). Making the tour difficult to navigate can completely ruin the user's experience and even force them to abandon the tour altogether. A simple but efficient method to increase the effectiveness of the tour's directions is to use reference points. Reference points reduce frustration for the tourist by providing easy navigation. With the inclusion of reference points, tourists have a way to get from point to point within the tour and a method verify that they are at the correct location. (Luga et al., 2016, Conclusions and Recommendations, p. 49-50, Appendix B). Another large inhibitor to Kyoto VR's audio tour will be something out of their control: the weather. Rain, snow, and hot days with high humidity will most likely dissuade tourists from using Kyoto VR's tour, and at points even restrict its use all together (Appendix B). A fix to this could be having the tour optionally take out any of the locations that are outdoors, leaving only the indoor ones.

2.2 Evaluating Audio Tour Effectiveness

Evaluating the effectiveness of audio tours is most commonly done by gathering user feedback, either through surveys or interviews. Feedback questions vary depending on the tour and the audio device.

One successful project, tested at the National Cemetery of Gwangju (South Korea), focused on conveying cultural heritage through an audio guide (Suh, Shin, Woo, Dow, & MacIntyre, 2011). The information in this paragraph is drawn from their article, "Enhancing and evaluating users' social experience with a mobile phone guide applied to cultural heritage," and describes their approach. During their research process, data was gathered by interviewing users about the following categories: spatial, personal, social, contents, story flow and navigation, interaction and interface, and overall enjoyment. Spatial questions consider topics like how easy it is to move from one site to the next and how aware the user is of his or her surroundings (p. 656). Personal questions are about the user's own satisfaction with the content, requesting that

the user rate how informative, understandable, and interesting the content was (p. 656). Social questions address how well the technology integrated with the user's social interactions with their traveling companions (p. 656). Questions about the contents ask if the audio was engaging, if the pace was appropriate, what the user's favorite sections were, etc. (p. 656). The story flow and navigation category is concerned with how easy it is to switch between the main story and other features (p. 656). Interaction and interface questions ask how well the user is able to interact with the technology (p. 656). Overall questions ask if users would use the guide again, and how they rate the audio and visual quality. By evaluating these categories, the researchers were able to create a comprehensive assessment of their guide.

The information in the following two paragraphs, including the "visitor attribute scales" was taken and repurposed from *An Audio State of Mind: Understanding behaviour around audio guides and visitor media*, by Shelley Mannion (2015). Another approach to audio tour evaluation comes from The British Museum reevaluation of their audio guide in 2015. They did so by interviewing users with the following attribute scales.

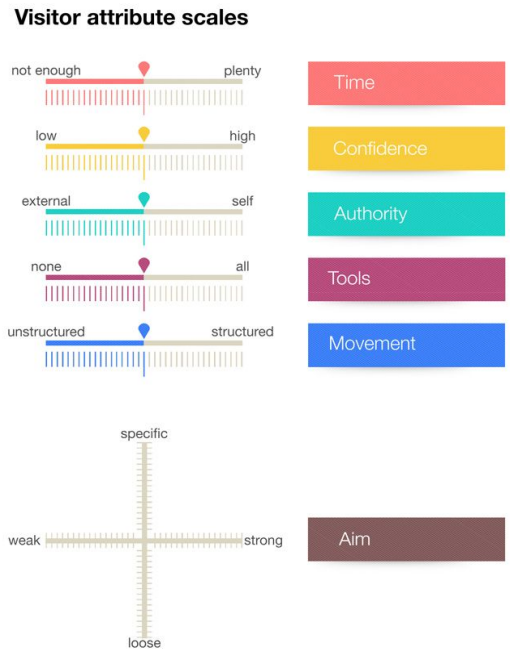
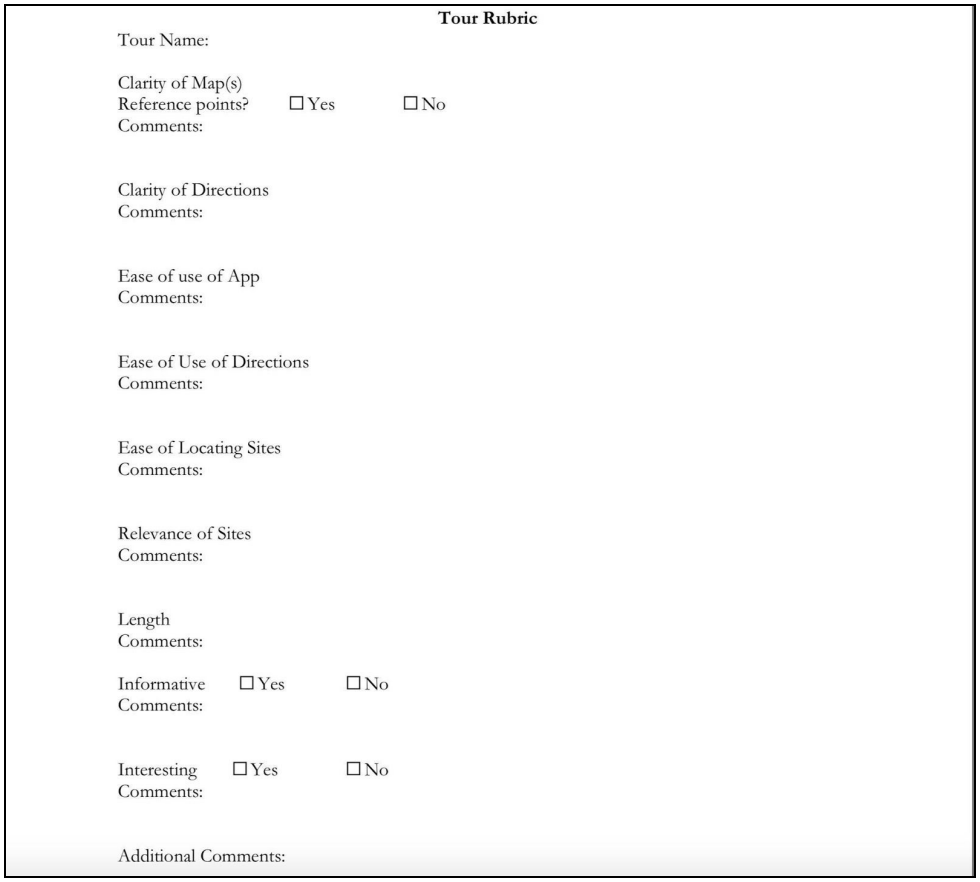


Figure 4: Visitor Attribute Scales (*An Audio State of Mind: Understanding behaviour around audio guides and visitor media*, by Shelley Mannion, 2015)

The time scale refers to the perception of time of the consumer and whether they felt they had enough time to take an audio tour. With this scale, the researchers learned that people would often assume they didn't have enough time for the tour, which was in fact self guided and would take as much time as the user wanted. The confidence scale indicates whether the visitor believes they can navigate themselves unaided. This scale revealed that tourists felt they were confident

enough to self navigate and understand. The authority scale refers to how determined a visitor is to guiding themselves unaided. The tools scale refers to the likeliness of visitors using guides and other assistant materials. Movement refers to how structured the route a visitor takes is. The aim scale refers to the motivations of the visitors and why they decided to tour the museum. Aim revealed that most visitors already knew exactly what they wanted to see and had a clear aim, and didn't feel that the audio tour would help that aim. For our project, the Visitor attribute scales would be a great tool to help us evaluate tourists in Kyoto. It would help us create archetypes and help us set a direction for Kyoto VR's improvement.

In evaluating the users of their audio guide, the British Museum found that 15-20% of the ones who actually did want to use the audio tour didn't have much patience for the tour. It was found that this subset of people were mostly visiting the museum in groups, and therefore felt the audio tour restricted their socialization within the museum. Meanwhile a majority of audio users, around 75%, relied solely on the audio guide. They would actively seek out the places where the audio guide was usable, and once they were satisfied moved on. This is important to our project, because it lets us know that most of the people who decide to use Kyoto VR's tour will rely solely on it. They will most likely not stray from the path it sets them on, and their entire experience will be based on what the tour provides, and nothing more.



Tour Rubric

Tour Name:

Clarity of Map(s)
Reference points? ☐ Yes ☐ No
Comments:

Clarity of Directions
Comments:

Ease of use of App
Comments:

Ease of Use of Directions
Comments:

Ease of Locating Sites
Comments:

Relevance of Sites
Comments:

Length
Comments:

Informative ☐ Yes ☐ No
Comments:

Interesting ☐ Yes ☐ No
Comments:

Additional Comments:

Figure 5: Princeton, Massachusetts Interactive Qualifying Project Tour Rubric (Luga et al., 2016, Appendix D, p. 61)

2.3 User Experience Testing

User experience testing is an important part of building and testing most technology-based products. A user's experience is all of the interactions that user has with a product or service. In turn, user experience testing gathers data on how users are interacting with said product. This data can be used to help improve the product and provide benefits to both Kyoto VR and their users. User experience testing also helps expose what problems the product has, allowing them to be fixed (Veal, 2018).

To gauge a user's experience with the product, there are several metrics. Metrics are an aspect of the user experience represented in a numeric format. There are three main types of metrics: task success, efficiency, and satisfaction measures. Task success measures are fairly simple - did the user complete the task or not?

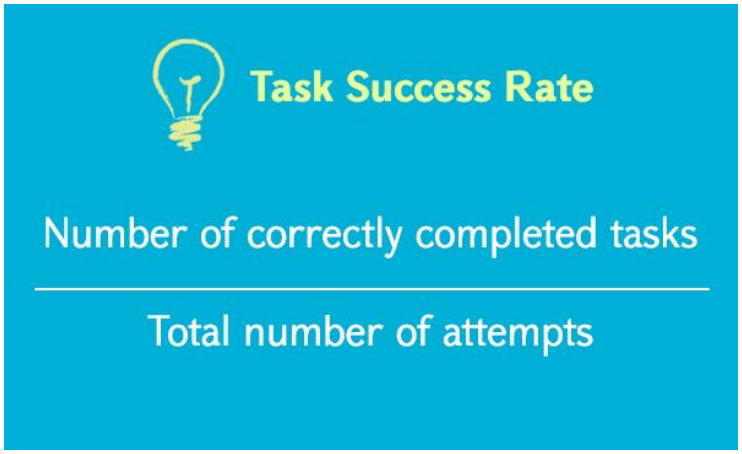


Figure 6: Example for a task success metric (Ghazaryan, 2015)

Efficiency measures track how much effort is required to use the product and specifically measure things like task completion time and ease of use. Satisfaction measures rate the overall user experience, and include aspects such as the user's emotional response to the product (Tullis, 2013). More can be found in **Appendix C**.

There are five main methods for conducting user experience testing: focus groups, usability testing, conducting interviews, surveys, and user personas. The following information comes from Raven Veal's *How To Conduct User Experience Research Like A Professional*. Focus groups are a good way to get a lot of information in a short amount of time. They help to answer: what users think of the product, what problems the users encounter with the product, where the product fails the user's expectations, and what users want to see in the future. One shortcoming of focus groups is that the responses are what the user says and less of what the user

actually does with the product. Another issue is that groupthink can occur in focus groups; The users will influence each other's answers.

Usability testing is used to identify problems with the product before time is wasted on developing these problematic aspects of the product. Usability testing provides information on how satisfied users are with the product and what changes are needed to improve user satisfaction and performance. However, it can be hard to conduct many usability tests due to their time consuming in-depth nature. Interviews are a good way to obtain in-depth background of the users of the product. They are usually performed one-on-one and last between half an hour to an hour. Interviews identify any misunderstandings customers have about the product. Interviews are also a good way to understand the user's emotions surrounding the product, and also help to understand answers from surveys.

Surveys are a helpful in obtaining a lot of information in a short amount of time. Surveys help discover what users want to accomplish and what they are looking for. However, surveys lack depth found in usability testing and interviewing. Additionally, surveys do not make up the differences between what users say and what users will actually do when they use the product. User personas are a good way to understand who will be using the product. Personas help influence the features and design of the product, increasing utility of the product. User personas help to discover the ideal customers of the product, what the behavioral patterns are for users of the product, and what the needs and the goals of the users are.

2.4 On-Site Interviewing Methods

For our project, we will be using the standardized interview for when we interview tourists to gather information about general interest, and the semi-standardized interview for when we gather information about the products functionality and conduct more hands on research with the product and its users. We will also be conducting a focus group towards the beginning of our project.

The standardized interview is conducted very formally, and is planned down to the wording of the questions. The questions are well thought out beforehand and as a unit act similarly to a survey. The disadvantage to the standardized interview is subject to a large number of biases, due to its restrictiveness of further probing on answers. These biases can include non-response, sampling, social desirability, and recall biases (Bhattacherjee, 73). When preparing for our survey, it is important that we think specifically about the wording of our questions. When deciding on wording, it is important to appear neutral and unbiased in your questions when doing a standardized interview. Often interviewers won't even realize their questions have some sort of weight to them. In addition, the language used must be understandable to the subject. When conducting a large standardized interview a *"zero-order level of communications*" is used, meaning that the questions are simplified and blunt, leaving no room for unintended interpretations. It is also critical to avoid leading questions, and to avoid

"double-barreled questions", meaning it asks the subject to simultaneously respond to two questions. Keeping questions short and precise is also good practice, as it ensures that the subject understands the question and isn't misinterpreting or forgetting part of it.

The semi-standardized interview is a bit less systematic than the standardized one. The wording specifically (such as colloquial terms and slang) is adapted to the specific interview in order to decrease the formality. While we should definitely make sure our wording is clear, it is okay for the questions to be a little looser than that of the standardized tests. This form of interview generally acts more like the in between of a survey and conversation. The questions are a bit more dynamic, and adapt to the flow of the interview, rather than "sticking to the script", in case useful information could be gained through other questions and conversation guidance. In addition to the interviews we will be performing, we will also be conducting a focus group in which six to ten respondents are interviewed together in a common location. The interviewer will lead a discussion and make sure everyone has a chance to respond. This method allows for a deeper examination of complex issues as discussions often are a birthplace of new ideas. However, these groups are easily dominated by individuals with dominant personalities, making other individuals reluctant to voice their opinions. This method of research is generally used for exploratory research as opposed to explanatory research (Bhattacherjee, 78; Berg, 12). For an in depth explanation of how to analyze a focus group, see appendix F.

2.5 Tourism In Kyoto

We wanted to get a sense of what tourists are looking for when coming to Japan, as to allow us to better assess where Kyoto VR's product fits into the tourist's visit. The experiences that have the most influence on whether or not a tourist enjoyed their visit to Japan are their experiences with food, shopping, and transportation (Shapoval, Wang, Hara, & Shioya, 2017). These experiences also have the most influence on how likely a tourist is to return to Japan. Additionally, despite the amount of information on the internet, tourists who used the popular series of travel books *Lonely Planet* as their primary source of information about Japan before their departure were more likely to enjoy their visit and to return to Japan again in the future. In addition, the ability to use credit cards as a method of payment also impacted tourists' satisfaction with their experiences (Shapoval, Wang, Hara, & Shioya, 2017).

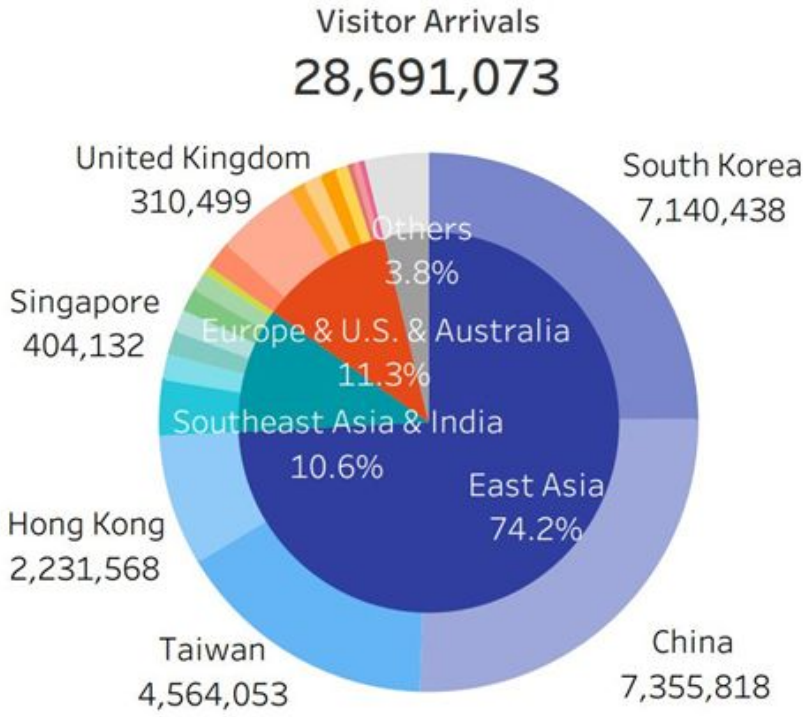


Figure 7: 2017 Total Visitor Arrivals to Japan by country/area (JNTO, 2018)

Of the 28 million tourists to Japan in 2017, approximately 75% of them were from East Asia, while only about 10% of them were from the United States, Europe, and Australia. 1.2 million tourists from the United States visited Japan in 2016. The majority of these American tourists stayed for more than a week, and 46% of them visited Kyoto (*Japan Tourism Statistics*, 2018). Tourism in Kyoto has been on an upward trend for the past 20 years. From 2000 to 2010, annual tourists increased by 25%, from 40 million visitors to 50 million visitors. This rise in tourists can be attributed to the mayor and the city government of Kyoto's focus on promoting tourism to the city. Starting in 2012, free Wi-Fi hotspots have been set up at transit stops and other public facilities. That same year, the city also created a "24-hour multilingual call center for tourists, starting with English, Chinese and Korean." Additionally, regulations have been put in place to preserve the picturesque landscape of Kyoto (Iuchi, 2014).

2.6 Creating User Profiles and Archetypes

One of the main tasks of this project is to create user profiles of the various people who will be using Kyoto VR's product. In our research, we discovered two main types of user profiles: behavioral archetypes and user personas. According to Paul Farino, a writer at Medium.com, behavioral archetypes "show how people are using your application, while

personas give insights into the people who are using your application" (Farino, 2013).

The information in this paragraph is drawn from Farino's article *Developing Archetypes* (2013). Behavioral archetypes attempt to portray how a user within the archetype is expected to behave. Typically, multiple archetypes specific to the application are created. By grouping users into these archetypes, the developer can better understand their needs. Some relevant topics to consider when creating an archetype include the focus of the users, how they behave while using the product, and their end goal when using a particular feature.

Creating behavioral archetypes may be useful for some aspects of the Kyoto VR project. For example, while some users may be comfortable with using the technology, some may be less technologically competent and thus complicated user interface could be a major pain point for them. Behavioral archetypes could help identify these groups. The downfall of behavioral archetypes is that they often rely heavily on usage data and statistics, something which we may have limited access to in our project.

The user persona, another form of categorizing users, focuses on users' personal attributes rather than their usage behavior. It is essentially the profile of an imaginary user who is based on and represents a number of actual users (Farino, 2013). The information in the next two paragraphs is largely drawn from the article titled *How to create a user persona* by Xtensio, at Xtensio.com.

The first step when creating a user persona is communicating with real users. This could be through interviews, surveys, or any other way you are able to exchange information (*How to create a user persona*; Vedenin, 2017). This information must then be recorded and analyzed in order to find trends among the users. According to Yuri Vedenin, founder of UXPressia, a company which offers tools for mapping customer experience, "it is important to keep in mind that a persona is a collective image of a segment of your target audience (TA). It cannot be the face of the entire TA. Nor can it be just one person. You need somewhat of a golden middle" (2017). With this in mind, a segment of users must be selected based on data trends. Once a group is selected, the persona can be created.

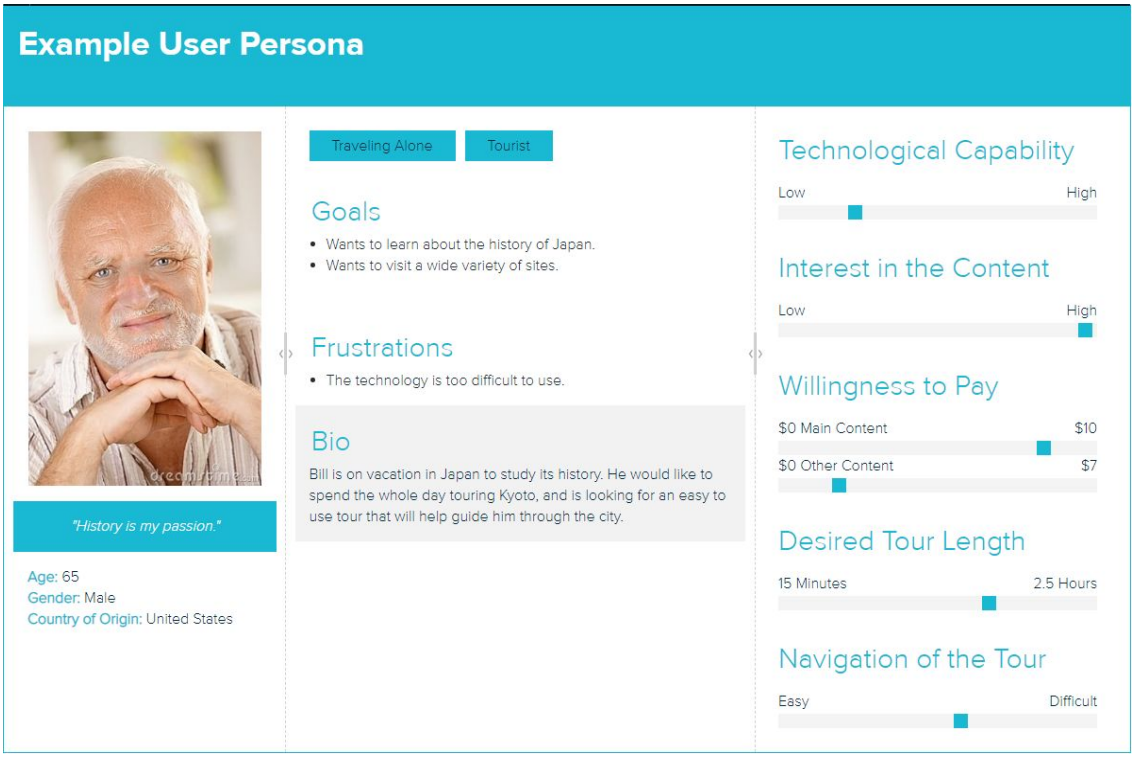


Figure 8: Example Template of a User Persona (Xtensio, 2018)

The persona itself can be broken up into three sections: the basics, the story, and the final details. It is important to note that any of the following categories can be replaced or altered in order to better fit the application. To begin with, there should be a section about the basics. This section includes the title, which could be a name or description of the persona. The important part is that the title is specific and intuitive. It is also helpful to include a photo, preferably of an actual user, to put a face to the persona (*How to create a user persona*; Vedenin, 2017; Cooper, 2007). There should also be at least one quote from a real user which "capture(s) the Persona's attitude towards your product." Including demographics such as origin, age, marital status, etc. and describing the persona's key personality traits to give a general idea of your persona's background is also important (*How to create a user persona*; Vedenin, 2017). The next section of the persona, the story, includes the persona's traits: a brief description of who the persona is and what sets them apart from other users "based on their personality, work ethic, motivations, and priorities." It also includes their goals (pertaining to the product), frustrations, and a short bio (*How to create a user persona*; Vedenin, 2017). Identifying frustrations is a major factor in improving the product. Finally, the final details include the persona's motivations, favorite brands, and preferred channels. A persona's preferred channel refers to what platforms they are most active on and the best way to reach them (television, Facebook, a newspaper, etc.).

Vedenin suggests a similar approach to the one above. An example profile from his article titled *How to create a persona in 7 steps - A guide with examples* is shown in the figure below.

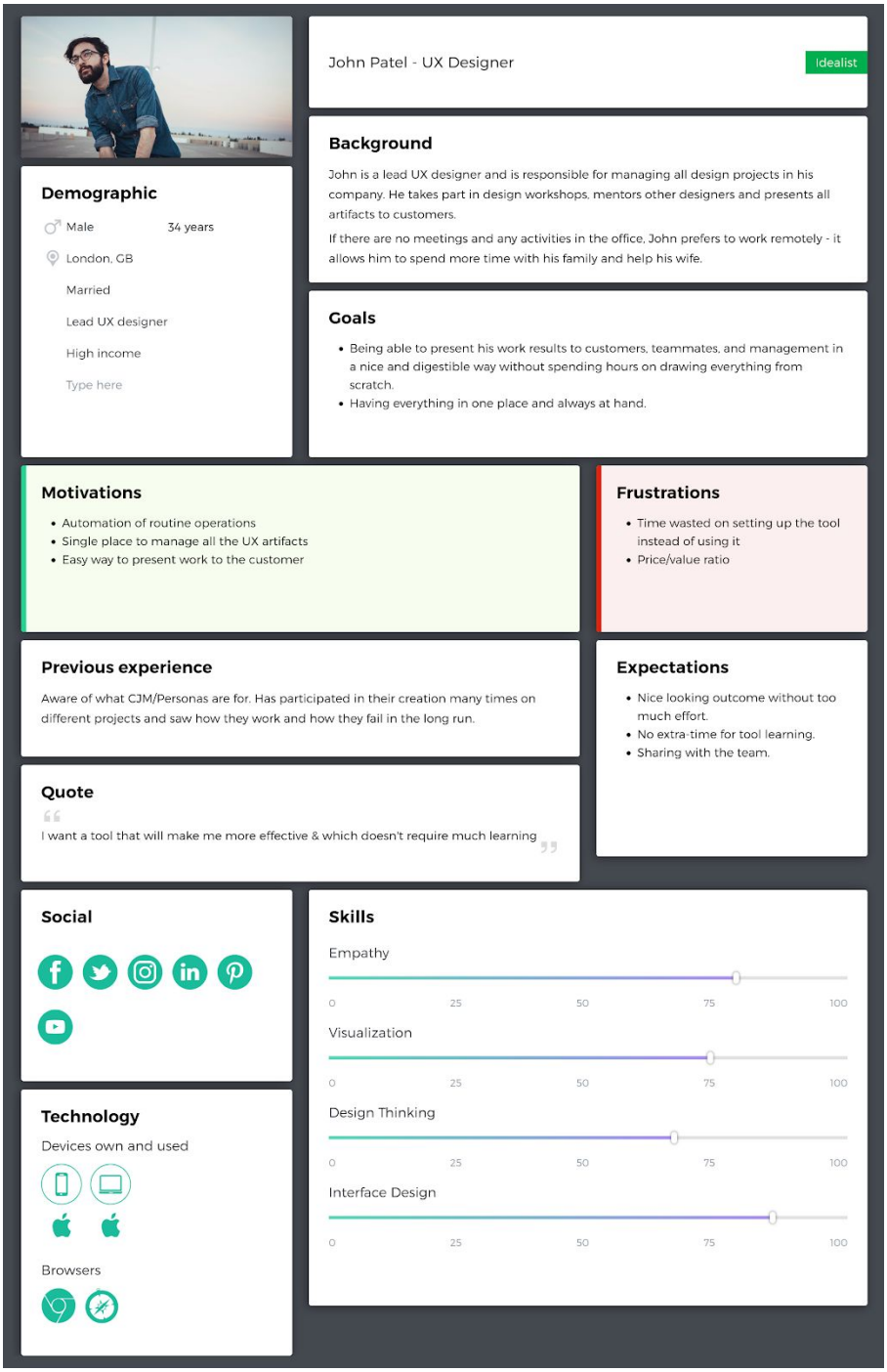


Figure 9: Example Template of a User Persona by UXPressia (Vedenin 2017)

All of the categories of the persona can be adjusted to fit the application. For example, for this IQP project, one of the traits listed might be the users technological capability. The priorities section would describe what they think is most important with regards to the product.

According to Alan Cooper, a pioneer in the use of personas as design tools, goals are a particularly crucial aspect of an effective persona. In his book titled *About Face 3 The Essentials*

of Interaction Design, Cooper says that "personas' goals motivate them to behave the way they do. Thus, goals not only provide an answer to why and how personas desire to use a product but also can serve as a shorthand in the designer's mind for the sometimes complex behaviors in which a persona engages and, therefore, for their tasks as well" (Cooper, 2007). When creating a persona, directly asking users what their goals are usually results in an inaccurate or insufficient answer; goals must be constructed by other means, such as observing user behaviors and answers to other questions (Cooper, 2007). Ideally, a persona will have three levels of goals: experience goals (how the user feels while using the product), end goals (what the user wants to get out of using the product), and life goals (long term goals, such as being a successful person) (Cooper, 2007). All in all, a persona is more about understanding users' goals and motivations than any specific task or demographic (Cooper, 2007).

Once a persona is created, it can be an immensely helpful tool for ensuring that business and product design decisions are aligned with the needs of the user. Cooper's full method for creating a user persona can be found in Appendix A.

2.7 Presentation Research

Learning and obtaining information and presenting it are two very different things. Creating a proper final presentation for Kyoto VR is integral to the success of our project. A lot of factors affect the quality of a presentation and the impact it has on the audience. We have researched a few key points to creating and giving a good presentation.

Perhaps the most important part of any presentation is the introduction. Most people stop listening to a presentation in the first ten minutes if they think that the presentation won't benefit them in any way. This is why making sure you grab the audience's attention early on in the presentation is critical to your success (*Rule The Room, 2013*). A good way to make sure the audience is interested, the introduction must be very short and concise. For this to happen, there shouldn't be too much introduction of the presenter- it is important to just stick to the presenter's name and job title and then focus on introducing the what you are presenting on. In addition, it is crucial to remain confident when delivering the introduction and to not show any signs of nervousness. An effective way to do this is to adopt the confident stance of standing straight with your hands on the side (*Rule The Room, 2013*). One's hands should only be used for articulation. Inflection of one's voice also plays a vital role in the delivery of the introduction and the presentation in general. A downward inflection at the end of a statement make one sound more confident (*Rule The Room, 2013; Enactus University of Toronto, 2018*).

Once the introduction has been delivered, it is time to deliver the hook. The hook has to make the audience feel something and get an emotional response from them. The emotions that the audience should feel are of happiness, success and freedom (*Rule The Room, 2013*). An effective hook must tell the audience why they want something, before knowing what they will

get out of it. After the delivery of the hook, the presenter must then give an outline of the agenda and the intended main takeaways from the presentation (*Rule The Room, 2013*). It is imperative here that the presenter don't read aloud each point- the audience is very capable of reading on its own. The best way to introduce the agenda is to list the number of takeaways and then paraphrase them (*Rule The Room, 2013*). Finally, one should end the first segment of the presentation with a credible statement, usually a fact, in one's favor to make the audience trust one as a speaker. Audience engagement early on in the presentation is also recommended.

Following the introduction and outline of the presentation, the main content takes on the role of deciding the effectiveness of one's presentation. It is usually good to begin the presentation with a shocking fact or a unique perspective that naturally flows into the main objective of one's presentation. An audience will generally only respond to ideas that are immediately relevant to them. A key way to do this as a speaker it is identify and know your audience, enabling one to tailor the presentation that benefits them specifically (*Practical Psychology, 2017*). For the presentation of the actual content, it is vital that one doesn't just randomly put points and information in support of the presentation's argument in the slides. It is very important to build a logical flow or narrative to make the presentation engaging and easy to understand. A good structure is the one where every idea builds on the one that comes before it. A presentation with a logical narrative is also easier to remember over just jumbled up facts (*Practical Psychology, 2017*).

Visuals play a crucial role in any presentation because they help the audience both remember and understand the information presented. According to the Social Science Research Network, 65% of the people in the world are visual learners (*Practical Psychology, 2017*). Visuals are also really helpful in presenting complex data since one doesn't have to go through every data point individually. When creating visuals, it is important to keep them as simple as possible so the audience can spend less time trying to understand them and more time listening to the presentation. Repetition also plays a key role in presenting, as it ensures that the audience remembers the key points in the presentation (*Practical Psychology, 2017*). This can be done by giving a brief outline or rundown of the key points in the beginning of the presentation, then repeating them throughout the main body and reiterating them in a final summary. The length of the presentation is also very important- It is vital that one keeps the presentation as short and concise as possible (*James, 2012*).

In order to convince your audience of the truth to the idea you are trying to present and make your argument credible, it is critical to use facts that are both quantifiable and verifiable rather than making generalities(*James, 2012*). It is also important to be relatable to the audience. On one hand, no one likes someone who is authoritative and on the other hand, no one likes someone who has little to no confidence. A good middle ground is someone who is both authentic and enthusiastic: someone who engages the audience mentally (*Practical Psychology, 2017*). Another way to be relatable is to not use big complicated technical words that results in a disconnect between the audience and the speaker (*James, 2012*). One of the signs of a good

speaker is someone who talks to the audience, not someone who just reads from the slides. Focusing on the audience and engaging them makes them focus on the presentation. Additionally, if a presenter wants their audience to be focused, one must schedule the presentation at times when the audience can remain attentive. For instance, avoid end of day, just before lunch, etc. (*James, 2012*) In addition, backtracking to previous slides or skipping to slides that come later on can seem very unprofessional. It is vital to make sure that the slides are ordered well and that the presentation doesn't contain any unnecessary slides or information (*James, 2012*).

Being prepared is incredibly important to the delivery of a presentation. If there is going to be a Q&A at the end of the presentation, predicting some questions in advance and preparing their answers is a must. Additionally, in case the presentation is very technical and contains numerous facts and figures, it is useful to have a handout prepared for the audience, rather than stuffing them into the slide deck (*James, 2012*). Presentations can also be interrupted due to some form of equipment failure, so it is important to check and make sure beforehand that all the equipment is working perfectly. As mentioned before, the tone of one's voice and its inflection plays a crucial role in the delivery of one's presentation. The tone used to address problems should be different from the tone used to suggest solutions. Problems should be addressed in a serious, sadder tone while solutions should be presented in a happier and cheerful tone (*Enactus University of Toronto, 2018*). One exercise that can be used is called "climb the stairs". This involves imaging one going up the stairs when addressing a solution, so that each following word is higher (in terms of the tone and emotion) than the one that comes before it. The same goes for when a problem is being addressed in a serious tone which is analogous to going down the stairs, where each following word is lower than the one preceding it (*Enactus University of Toronto, 2018*).

The final important component of any presentation is the slide deck. For a professional presentation, the deck should also be professional. The best way to do this is to keep everything simple. One picture or graphic per slide is appropriate (*EnglishLessons4U - Learn English with Ronnie! [engVid]], 2016*). Too many visuals in a slide can confuse the audience and may not register in their minds. The fonts must be readable, such as Calibri or Times New Roman. Additionally the fonts should be kept large enough to make them discernible by the audience (*EnglishLessons4U - Learn English with Ronnie! [engVid]], 2016*). The amount of text per slide must be limited to two to three lines, since too much text becomes hard to register in the minds of the audience. Fancy backgrounds, too many special effects and too many colors on the deck must be avoided (*James, 2012*). A good way to do this is to use a background that is a single color and is in strong contrast to the color of the text. A different color can also be used to emphasize important words in the text (*EnglishLessons4U - Learn English with Ronnie! [engVid]], 2016*). All the aforementioned points can help one deliver a very professional and effective presentation.

2.8 Research Conclusions

By researching existing audio tours, IQP's, and other projects, we have learned effective strategies for critiquing and improving Kyoto VR's audio guide. These techniques, such as what questions to ask users when gathering feedback, will allow us to be informed consultants when we start working with Kyoto VR when we arrive in Japan.

Chapter 3: Methodology

**** Indicates question will be updated once we know more about the product***

3.1 Goal Statement

Our goal is to create a final report for Kyoto VR that can be used to improve their audio tour of Kyoto. This report will include a presentation, a brief written document, and anecdotal accounts of general users giving feedback. These accounts will include text and video. The report will provide data and conclusions regarding:

1. Feedback on content drawn from our background research and on-site fieldwork
2. Sticking points that would inhibit adoption
3. Users' willingness to pay for various aspects of the product
4. "User Profiles" outlining several archetypes of users we encounter in the field
5. Possible product features for future implementation

3.2 Overview of Methods

1. Familiarize ourselves with the product
    a. Perform initial interview with sponsors
    b. Test product ourselves, comparing it to prior research done on successful products
        i. Test Product UI - how the product itself works
        ii. Take the tour - how the product conducts the tour
    c. Perform post interview with sponsors
        i. Product Specifications
        ii. Predicted problems with implementation - Find out what they are and assess them
    d. Analyze and evaluate our findings
        i. Feedback on predicted problems
        ii. Feedback on product UI and the tour
        iii. Hypothesize what users will think depending on our findings* *tentative*

2. Organize distribution of User Experience Testing (Survey, Interviews, and Focus Groups)
    a. Focus Group
        i. Set up focus groups
        ii. Rework focus group questions as necessary based on our familiarization with the product

b. Field Survey
    i. Rework field survey based on our understanding of the product
c. Interviews
    i. Rework pre-interview questions based on our initial tour experience
    ii. Plan a tour group and predict possible behaviors and reactions of tourists that may be observed during the tour
    iii. Work on post-interview and rework questions based on our initial tour experience

3. Gather Data *(Tentative to change upon arrival and availability of focus group)*
    a. Conduct focus group interview
    b. Conduct survey interviews with tourists in Kyoto
    c. Organize tour group for testing
        i. Conduct a pre interview
        ii. Observe and record tourist reactions during the tour (Usability Testing)
        iii. Conduct post interview (record them)

4. Evaluate data
    a. Organize focus group responses and evaluate
        i. Observe trends
        ii. Draw conclusion
    b. Organize survey responses
        i. Observe trends
        ii. Draw conclusion
    c. Organize pre-interview data
        i. Observe trends
    d. Organize tourist reactions during tour group
        i. Observe trends
        ii. Predictions test
    e. Organize post interview data
        i. Observe trends
        ii. Variation in responses
        iii. Draw conclusion
    f. Develop User Profiles
        i. Compile all the data from interviews
        ii. Develop personas

5. Form conclusions and recommendations
    a. What do people think of the product
        i. Consensus

ii. Results by user profiles

b. Identifying sticking points
   i. Based on what users said
   ii. Based on what we observed
c. Will they pay?
d. Recommendations for future implementation

6. Present results to Sponsor
   a. Written Document
   b. Presentation

3.3 Methods and Methodology

3.3.1 Familiarize ourselves with the product

a. Perform initial meeting with sponsors

Before any field research can be conducted, we will need to introduce ourselves to our sponsors, Kyoto VR. We will then ask to use the latest version of the product in order to test it. We will make sure to clarify that we don't want to know how to use the product or about its features, in order to stay unbiased for our initial field test.

b. Take the audio tour individually

After speaking to the sponsors, we will use the product for the first time. We will take the tour splitting into two groups of two and an additional solo user. We will do this separation to create an understanding of what it's like to use the product as an individual traveler, and with another person. As we go on our initial tour, we will be paying special attention to certain aspects of the tour. These aspects were highlighted in our background research (see Background: Audio Tours) as some of the most important components of an audio guide. These include: the user interface, ease of navigation, site locations, audio content, and any other aspects of the tour which stand out. We will take turns taking the tour, with one group taking the tour and one group evaluating, in order to test our method. We will also keep track of all the features of the product we find, in addition to any notes we have about the content and how intuitive the product is. We will be using a field sheet to evaluate our first pass through each site on the tour. This field form can be found in Appendix H5.

c. Follow up interview with sponsors

Once we have taken the tour, we will follow up with Kyoto VR. We will perform an interview in which we will ask them to go over the product and its intended use in detail. We will begin this interview by asking how the product works and for a list of features. We will compare their list of features to the ones we found, taking note of any we missed. As the

interview continues, we will work our way into asking questions pertaining to the work we will be doing and any problems they are anticipating. The goal of these questions will not only be to learn more about the product, but to also learn the restrictions of changing the product so we can make proper suggestions in our final presentation. See Appendix H1 for a full listing of questions for sponsors.

d. Analyze and evaluate our findings

After our we have introduced ourselves, used the product, and familiarize ourselves with both Kyoto VR and the tour, we will begin to analyze our initial test of the product and form early analyses of what can be improved. We will do so by comparing our field sheets among our three tour taking groups, and comparing those with Kyoto VR's explanation of the product and its features/intended use.

3.3.2 Prepare for the interviews

a. Prepare focus group and questions

Following our interview with Kyoto VR, we will work with them to set up focus groups for interviews (assuming they don't have one ready). As per what we learned in our research (See Background Review: Onsite Research Methods), we will make sure to have a wide range of users in this focus group. A focus group is important because it allows us to explore issues users have with the product and allow us to pinpoint exact sticking points within the tour which are essentially aspects of the tour that might make it unpleasant to the users. We will begin the gathering of this focus group first, as it will most likely take a little while for it to come together. We will use this time to rework our focus group questions that can be found in Appendix H2. We will do this review according to what we have learned about the product. This reworking of our focus group survey is important because after we learn more about the product we may have a new perspective to ask different questions pertaining to the product and its use. In addition, we will need to remove any questions that aren't relevant or don't make sense with respect to the product.

b. Rework field survey questions

As with the focus group questions, our fieldwork survey questions may need to be reworked. In the same manner as the step 2a, we will be looking at what we learned about the product and based on that evaluating whether we need to add, remove, or modify any of our questions.

c. Prepare for usability testing

Using our predicted problems with the product implementation, we will develop a list of tasks for tests users to perform during the tour. Each task should have a list of the time the

task should take to complete, the necessary technology needed to do the task, and a procedure for what the user should do. For an example, see Appendix C.

Each usability session, we will make sure to have at least five users so we can identify the most important usability problems. Additionally, we will try and schedule executives from Kyoto VR join us for the usability testing so they can internalize the user feedback for themselves.

d. Consent Form

In line with the ethics of interacting with human subjects and the regulations enforced by the Institutional Review Board, we will design a mandatory consent form, which can be found in Appendix H6. This consent form will be given out prior to the interviews, especially in the cases of focus groups and tour group interviews, and be required to filled out. The purpose behind handing out a consent form is to make sure that the participants of the interview are aware of the goal of the interview and consent to the use of their information for our project.

3.3.3 Gather Data

a. Conduct focus group interviews

From here we will begin conducting our research with the focus group we set up in step 2a. Our interview questions for this part can be found in Appendix H2 under *Focus Group Interview Questions*. As per our research (see Background: Onsite Research Methods), it is critical at this focus group to go in depth into the thoughts and opinions users have on the product. In addition, we will need to confirm that every participant in the focus group is able to verbally contribute. We will try to avoid allowing anybody to dominate the conversation, because this may silence others and not allow them to give us critical information about their opinion of the product. We will prevent this by constantly maintaining the atmosphere and tone of the discourse, allowing everybody to speak. We will be recording this entire discussion with both audio and if allowed by both Kyoto VR and the users in the focus group, video.

b. Conduct survey interviews with tourists in Kyoto

At this point we will conduct on the ground surveys with tourists in Kyoto. We will be doing this with only english speaking tourists*. As we learned from our research (see Background: Onsite Research Methods), this survey should be done in a timely manner, taking no more than 2 minutes. It will not have any questions that could be interpreted in different ways and will be straight to the point. Our goal with the survey is to gauge interest in the product, help steer advertising for the product in the correct direction, willingness to pay for its content and/or additional features.

c. Organize tour groups for user testing

From here we'll begin the most important and key part of our project: user experience testing. To begin, we will organize groups of tourists to test out the tour. We will give them minimal information about it, as to gather unbiased results. We will begin with a pre-interview, in which we will evaluate their demographic areas, their technological ability, familiarity with audio tours, and interest in the idea of Kyoto VR's tour (See Appendix H3 for a full list of pre- interview questions). We will be doing this pre-interview to both gain an understanding of each user and their feelings towards the tour *before* they take it, and create user archetypes. We will later compare these with the post interview results.

Next, we will conduct usability testing. We will have the tourists take the tour and try and complete the list of tasks we developed earlier. We will take note of everything the participants do, including where they go, what they say, and potentially even write down some direct quotes and the time to keep track of how long it takes participants to do certain tasks. We will also write down any verbal and facial cues and emotional responses that the tourists exhibit. Most importantly, we will not make any judgements on what the user is doing during the testing to minimize the bias of the data we get from the testing (see Appendix C for more information).

After the tour is complete, we will ask users to participate in a post-interview. This interview will include questions about their feelings towards the tour and its content, what they liked and disliked, and their ability to proper use the product (see Appendix H3 for full list of post-interview questions). The goal of this post-interview is to gauge how much they liked the product, what could be improved with the it, and their feelings towards the tour and the product as a whole.

3.3.4 Evaluate Data

a. Organize focus groups responses and evaluate

Once a few focus groups with varying demographics have been conducted, the results will be evaluated by the team. This evaluation will involve reviewing all the answers given by the participants and trying to quantify them so that all this data, which in some cases may be subjective, can be used to evaluate the market fit of the product. Since this product needs extensive user testing, the results of this evaluation will be very crucial. The evaluation of the data received from these focus groups will be evaluated in two steps.

Observe trends

All the data that will be obtained after collecting all the objective responses and quantifying all the subjective responses will be be analyzed to observe any trends. All the data will be quantified via behavioral development variables using the persona in Appendix G. For the aspects of the data that don't relate to

behavioral variables like the length of the tour for instance, we will be using that as a fixed variable and plotting the demographics of the users against it. This will help establish a relation between that aspect of the product and the kind of users who like or dislike it. This analysis involves seeing if there are any similarities or differences in the answers provided by a group of people from a specific age group, technological background, nationality, gender, etc. The aim will be to see how these aforementioned factors will affect the kind of experience a certain user from a specific background or a combinations of such backgrounds will have with this product and what needs to be done to accommodate them.

Draw conclusion

After the trends in the data points have been established, a conclusion will be drawn regarding the likeability of the product and the issues highlighted by the users. This conclusion specific to the data collected from the focus groups will later be compared with the conclusions drawn from other testing methods and all of these conclusions will culminate into a final conclusion.

b. <u>Organize survey responses</u>

After the team has surveyed numerous tourists from varying backgrounds, the survey responses will be collected. The survey responses will be very crucial in evaluating the user interface of the product and the appeal of the product in its face value. The responses to the survey will help determine whether the tourists even want a product like that and what it is they like about it and what it is they don't. One of the key questions being answered by this field survey will be user willingness to pay since an individual's willingness to purchase the product will heavily depend on its immediate initial appeal. This evaluation will also be done in two steps.

Observe trends

Similar to the focus groups, all the data obtained from surveys will be compiled and plotted to observe any trends as found in Appendix G and mentioned before. The trends will help determine the groups of people who find the product appealing and are willing to pay for it and vice versa. These findings will help suggest what specific changes that need to be made to the user interface and the general operability of the product to accommodate which group of people and thus all of those changes will collectively attract a much larger audience.

Draw conclusion

Based on the trends observed, a conclusion will be drawn on the immediate appeal of the UI and the product itself. This conclusion will be combined with the conclusion drawn from the focus groups to draw an even more comprehensive conclusion on the market fit of the product.

c. **Organize pre-interview data**

Once a tour group of people from diverse backgrounds is selected, they will be pre-interviewed. The data collected from this interview will work as a starting point, a for the level of interests of the users in tour audio guides in general and the product by Kyoto VR specifically, along with their willingness to pay for such services. It will also serve as a tool to develop demographics statistics of the people in the tour group. The data collected will be evaluated in the following way.

Observe trends

The trends observed from the data collected during the pre-interview will help create relations between user backgrounds. For instance, trends from the data collected can be used to determine on average people from which country and what age group have what level of technical proficiency, which will consequently play a major role in determining user archetypes and creating profiles.

d. **Organize tourist reactions during tour group**

Observing the users interact with the product during the tour will be a very crucial data point. This data point will in fact be the real world test for the product itself. The users' reactions will be very subjective and may vary greatly but if enough tour groups are tested and the outliers are ignored, there will be some trends observed. The behaviors observed and the reaction recorded will be quantified to a form of data where it can be used to infer trends and test predictions. The data evaluation will take place in two steps.

Observe trends

As trends start emerging from a big data pool, they will be used to determine the kinds of responses that will be observed on average from people from specific backgrounds as mentioned before and found in Appendix G. The accuracy of these trends will then be established by comparing them to the predictions made by the groups.

Predictions test

The predictions test will play a very crucial part in determining whether the product is behaving in the way we and Kyoto VR predicted it would behave among the users. During the predictions test, the predictions made after testing the product ourselves will be used to observed trends and determine if they follow a certain pattern. If the trends are as we predicted, that means the product fits the market very well. On the other hand if there are glaring inconsistencies between our predictions and the trends observed, it could mean that there are still some outliers, the method of data collection is incorrect, the data collected is biased and incorrect or the worst case scenario,

the product didn't fit the market the way we predicted. A failure of this test would mean it is time to go back to the drawing board and conduct retests with the changes made.

e. Organize post interview data

The data collected from the users in the interview after the tour will provide a comprehensive test of how the product performed in the real world after being used by actual users. This test will highlight and emphasize all the issues with the product, its advantages, which users like it and why. Most importantly it will record and measure how and the extent to which the answers to the pre-interview changed.The evaluation will be done in three ways.

Observe Trends

The data collected from the post interview will be compiled to determine any trends in the responses recorded and the background of the users as found in Appendix G and mentioned before. The trends will also be used to determine a relation between the background of users and the way and the extent to which their responses varied from the pre-interview to obtain a generalized and mean variation in the responses.

Variation in responses

The variation in the responses recorded in the pre-interview and the post-interview will be a really good and quantifiable measure of the market fit of the product and its ability to gauge interest in an otherwise disinterested audience. It is not the absolute value of the responses in the post interview which determine the aforementioned measure, it is the amount by which those responses change from their initial value recorded in the pre-interview which is a true measure. For instance, a user who was very willing to take this audio tour and pay for it both in the pre-interview and the post-interview is a positive indicator of Kyoto VR's product's popularity among users who are aware of the specifications of an audio guide and generally like them. In contrast, the user who wasn't as positive in taking this tour or paying for it in the pre interview but was a lot more willing to do both in the post interview, will be a positive measure of the ability of the product to gauge interest in an otherwise disinterested audience.

Draw conclusion

The observed trends and variation analysis will help draw crucial conclusions about the market fit of the product and whether the users actually like this particular product.

f. Develop User Profiles

One of the deliverables for this project is a collection of user profiles of the tourists and travelers who will be using the product. There are many methods of creating a user profile. Our research focused primarily on behavioral archetypes and user personas. For this project, we will not be using behavioral archetypes because they rely too much on usage data, which we may have very limited access to. We will also not be creating user personas, because the aspects of the user we are concerned with are not the aspects which make up a typical persona. Instead, we have chosen to make profiles of the various usage trends we find. Our method for creating these profiles is based on Alan Cooper's method of creating user personas because his method relies on data gathered directly from the user through interviews and surveys. However, the final outcome of our method will be a usage trend profile rather than a persona. All of the tour group interviews, surveys and focus groups will involve questions that help determine these user profiles. The user data collected will be compiled to get multiple comprehensive profiles of all the users interviewed. For instance, the answers to the questions in Appendix H will be used to determine a person's age group, country of origin, technical proficiency, gender, knowledge of and interest in audio guides, problems and frustrations with the product, etc., all of which will be quantified. We will use this data to identify behavioral variables between users, and then give each user a "score" for each variable. Once the users have been scored, we will place them on a scale for each variable in order to identify groups of users who have similar scores in multiple variables. These groups will go on to become user profiles. We will create multiple user profiles in an attempt to accurately portray as much of the user base as possible. Our full method for creating user profiles can be found in Appendix G.

3.3.5 Form Conclusions and Recommendations

a. <u>What do people think of the product</u>

Once the product has been tested and interviews have been analyzed, we will determine the overall view of the product. This is important, because Kyoto VR will not want to be bogged down by too many conclusions or different data points. Our presentation should provide a quick and insightful analysis of the product. Determining an overall view of the product (ie people liked it/disliked it) will accomplish this goal. This will in turn help Kyoto VR to tailor the audio guide to the different user profiles and help the product to be something everyone can enjoy.

b. <u>Identifying sticking points</u>

When analyzing the focus group and user experience testing results, we will find the sticking points of the product. These will be parts of the product that users found impaired or even inhibited their use of it. It will be important to identify these as they could decrease the

market value and enjoyability of Kyoto VR's product. In identifying these, we give Kyoto VR the opportunity increase the intuitivity and usability of the product.

c. Will they pay?

It is important to determine whether or not users would be willing to pay for this product because Kyoto VR still has yet to determine a price or if they will charge at all*. If we discover users are willing to pay for this product, we will determine a price based on the answers they gave us. If the users are not willing to pay for the product, we must figure out why that is and whether it is due to a specific reason other than simply a lack of desire.

d. Recommendations for future implementation*

After all conclusions and summings have been made, we will user both our background and field research to find solutions to any problems Kyoto VR's product has, in addition to determining the need for any additional features. This will potentially be the most important part of our findings, as it will highlight exactly what Kyoto VR needs to do to increase their products value and properly bring it to market in a completed form.

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Appendices

APPENDIX A: CONSTRUCTING PERSONAS

The following is a selection of direct quotes from *About Face 3 The Essentials of Interaction Design* by Alan Cooper.

Creating believable and useful personas requires an equal measure of detailed analysis and creative synthesis. A standardized process aids both of these activities significantly. The process described in this section, developed by Robert Reimann, Kim Goodwin, and Lane Halley at Cooper, is the result of an evolution in practice over the span of hundreds of interaction design projects, and has been documented in several papers.[11]

The principle steps are:
1. Identify behavioral variables.
2. Map interview subjects to behavioral variables.
3. Identify significant behavior patterns.
4. Synthesize characteristics and relevant goals.
5. Check for redundancy and completeness.
6. Expand description of attributes and behaviors.
7. Designate persona types.

Step 1: Identify behavioral variables

After you have completed your research and performed a cursory organization of the data, list the distinct aspects of observed behavior as a set of behavioral variables. Demographic variables such as age or geographic location may also seem to affect behavior, but be wary of focusing on demographics because behavioral variables will be far more useful in developing effective user archetypes.

Generally, we see the most important distinction between behavior patterns emerge by focusing on the following types of variables:
Activities— What the user does; frequency and volume
Attitudes— How the user thinks about the product domain and technology
Aptitudes— What education and training the user has; capability to learn
Motivations— Why the user is engaged in the product domain
Skills— User capabilities related to the product domain and technology

Step 2: Map interview subjects to behavioral variables

After you are satisfied that you have identified the set of significant behavioral variables exhibited by your interview subjects, the next step is to map each interviewee against each variable. Some of these variables will represent a continuous range of behavior (for instance, from a computer novice to a computer expert), and a few will represent multiple discrete choices (for example, uses a digital camera versus uses a film camera).

Mapping the interviewee to a precise point in the range isn't as critical as identifying the placement of interviewees in relationship to each other. In other words, it doesn't matter if an interviewee falls at precisely 45% or 50% on the scale. There's often no good way to measure this precisely; you must rely on your gut feeling based on your observations of the subject. The desired outcome of this step is to accurately represent the way multiple subjects cluster with respect to each significant variable (see Figure 5-4).

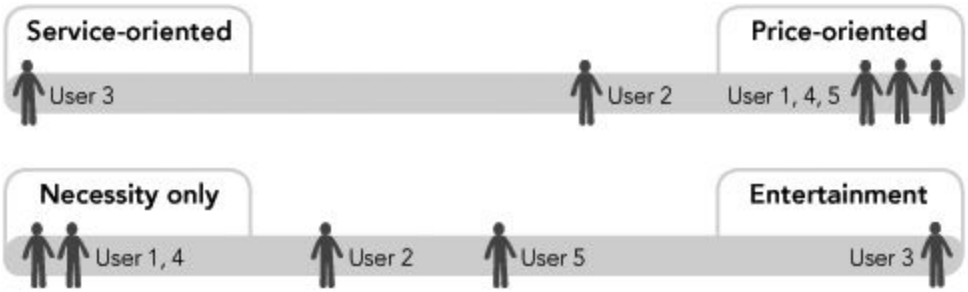


Figure 10: Example of Placing Users on Behavioral Variable Scales (Cooper, 2007)

This example is from an online store. Interview subjects are mapped across each behavioral axis. Precision of the absolute position of an individual subject on an axis is less important than its relative position to other subjects. Clusters of subjects across multiple axes indicate significant behavior patterns.

Step 3: Identify significant behavior patterns

After you have mapped your interview subjects, look for clusters of subjects that occur across multiple ranges or variables. A set of subjects who cluster in six to eight different variables will likely represent a significant behavior pattern that will form the basis of a persona. Some specialized roles may exhibit only one significant pattern, but typically you will find two or even three such patterns.

For a pattern to be valid there must be a logical or causative connection between the clustered behaviors, not just a spurious correlation. For example, there is clearly a logical connection if data shows that people who regularly purchase CDs also like to download MP3 files, but there is probably no logical connection if the data shows that interviewees who frequently purchase CDs online are also vegetarians.

Step 4: Synthesize characteristics and relevant goals

For each significant behavior pattern you identify, you must synthesize details from your data. Describe the potential use environment, typical workday (or other relevant context), current solutions and frustrations, and relevant relationships with others.

At this point, brief bullet points describing characteristics of the behavior are sufficient. Stick to observed behaviors as much as possible. A description or two that sharpens the personalities of your personas can help bring them to life. However, too much fictional, idiosyncratic biography is a distraction and makes your personas less credible. Remember that you are creating a design tool, not a character sketch for a novel. Only concrete data can support the design and business decisions your team will ultimately make.

One fictional detail at this stage is important: the personas' first and last names. The name should be evocative of the type of person the persona is, without tending toward caricature or stereotype. We use a baby name book as a reference tool in creating persona names. You can also, at this time, add in some demographic information such as age, geographic location, relative income (if appropriate), and job title. This information is primarily to help you visualize the persona better as you assemble the behavioral details. From this point on, you should refer to the persona by his or her name.

Synthesizing goals

Goals are the most critical detail to synthesize from your interviews and observations of behaviors. Goals are best derived from an analysis of the behavior patterns comprising each persona. By identifying the logical connections between each persona's behaviors, you can begin to infer the goals that lead to those behaviors. You can infer goals both by observing actions (what interview subjects in each persona cluster are trying to accomplish and why) and by analyzing subject responses to goal-oriented interview questions (see Chapter 4).

To be effective as design tools, goals must always directly relate, in some way, to the product being designed. Typically, the majority of useful goals for a persona are end goals. You can expect most personas to have three to five end goals associated with them. Life goals are most useful for personas of consumer-oriented products, but they can also make sense for enterprise personas in transient job roles. Zero or one life goal is appropriate for most personas. General experience goals such as "don't feel stupid" and "don't waste time" can be taken as implicit for almost any persona. Occasionally, a specific domain may dictate the need for more specific experience goals; zero to two experience goals is appropriate for most personas.

Step 5: Check for completeness and redundancy

At this point, your personas should be starting to come to life. You should check your mappings and personas' characteristics and goals to see if there are any important gaps that need filling. This again may point to the need to perform additional research directed at finding particular behaviors missing from your behavioral axes.

If you find that two personas seem to vary only by demographics, you may choose to eliminate one of the redundant personas or tweak the characteristics of your personas to make them more distinct. Each persona must vary from all others in at least one significant behavior. If you've done a good job of mapping, this shouldn't be an issue.

By making sure that your persona set is complete and that each persona is meaningfully distinct, you ensure that your personas sufficiently represent the diversity of behaviors and needs in the real world, and that you have as compact a design target as possible, which reduces work when you begin designing interactions.

Step 6: Expand description of attributes and behaviors

Your list of bullet point characteristics and goals arrived at in Step 4 points to the essence of complex behaviors, but leaves much implied. Third-person narrative is far more powerful at conveying the persona's attitudes, needs, and problems to other team members. It also deepens the designer/authors' connection to the personas and their motivations.

A typical persona description should be a synthesis of the most important details observed during research, relevant to this persona. This becomes a very effective communication tool. Ideally, the majority of your user research findings should be contained in your persona description. This will be the manner in which your research directly informs design activities (as you will see in the upcoming chapters).

This narrative should be no longer than one or two pages of prose. The persona narrative does not need to contain every observed detail because, ideally, the designers also performed the research, and most people outside the design team do not require more detail than this.

The narrative must, by nature, contain some fictional situations, but as previously discussed, it is not a short story. The best narrative quickly introduces the persona in terms of his job or lifestyle, and briefly sketches a day in his life, including peeves, concerns, and interests that have direct bearing on the product. Details should be an expansion of your list of characteristics, with additional data derived from your observations and interviews. The narrative should express what the persona is looking for in the product by way of a conclusion.

When you start developing your narrative, choose photographs of your personas. Photographs make them feel more real as you create the narrative and engage others on the team when you are finished. You should take great care in choosing a photograph. The best photos capture demographic information, hint at the environment (a persona for a nurse should be wearing a nurse's uniform and be in a clinical setting, perhaps with a patient), and capture the persona's general attitude (a photo for a clerk overwhelmed by paperwork might look harried). The authors keep several searchable databanks of stock photography available for finding the right persona pictures.

APPENDIX B: INTERVIEW WITH THE DIRECTOR OF THE WORCESTER HISTORICAL MUSEUM

Our team was put in contact with William Wallace, the Executive Director of the Worcester Historical Museum (WHM), with the intention of interviewing him for additional background research on the do's and don'ts of self guided tours. The Worcester Historical Museum provides, in addition to its charming and surprisingly modern exhibits depicting the history of the city of Worcester, brochure based walking tours that can be taken any time for free. We met with Mr. Wallace on September 14th and conducted our interview. Vanessa Bumpus, the Exhibitions Coordinator of the museum, also sat in as she's the creator of many of these tours. While the Worcester Historical Museum doesn't have an actual audio tour, we still learned a bit of key information from them. It was also helpful to simply hear firsthand about what goes into a successful tour from people who actually design and run them.

The first and arguably most important thing both Mr. Wallace and Ms. Bumpus wanted to stress about the key to a successful tour is that it needs to be fun and accessible. Often families will take tours together, and the age range of these families can stretch from 7 to 70. In addition, we learned that (at least for the Worcester Historical Museum) audiences of these tours are often repeat users. Both Mr. Wallace and Ms. Bumpus also made it incredibly clear that having a tour be circular (ie you end up where you start) is incredibly important. It increases the desirability of the tour, because you won't have to finish the tour and walk back the same distance as the tour to your car.

As for suggestions as to how to improve the content of a tour, Mr. Wallace and Ms. Bumpus had three key suggestions. First, they said to create an overarching narrative. Putting a story behind what users are learning can greatly increase the fun and excitement the tour brings. Next, Mr. Wallace said that it is critical to include the predicted time the tour will take on the description of the tour. This is important because users may be disappointed with the tour if it's too short, or feel as though it drags on if it's too long. Finally, Ms. Bumpus made it clear that the content of the tour needs to be as accurate and up to date as possible. Even one incorrect location of outdated fact will immediately bring down the users review of the tour. Incorrect information discredits the assumed legitimacy of the tour, and suddenly the user wouldn't know what information to trust.

For any tours that they charge for, they tend to not see any form of audience dip. They claim that if the tour is well advertised and seems fun, people will take it for any reasonable price (below 20 dollars). This is especially true when the tours are themed, such as their halloween themed "Ghost Tour of Worcester". In fact, the only inhibitor they could think of for their tours is the whether. As an uncontrollable (and in New England *very* unpredictable) factor, the whether can be incredibly detrimental to the number of tourists taking the WHM's outdoor tours.

APPENDIX C: USER EXPERIENCE TESTING METHODOLOGIES

Time	3–12 minutes
Hardware	Two PCs connected to network
Software and data files	Electronic mail software Mail account for participants Incoming mail message to reply to Existing account to send reply to
Instructions and procedures	Text of reply (or information to create text) Procedure for restoring account to initial condition

Figure 11: Example Task for users during Usability Testing (Dumas, 1999)

The following information originates from *Tutorial how-to conduct usability testing* on Drupal.org.

Taking Notes

- You could take notes during the session or visit the recordings and take notes later. Choose a way that is most comfortable to you
- Note everything that the participant is doing – where does the participant go, what does the participant say, note quotes and timestamps for relevant things. Also, look for verbal cues and facial cues (if in person).
- Remember, while taking notes: Refrain from judging what is an issue and what is not. Doing that while taking notes adds to the 'note taker's bias'. See yourself as a scribe, taking notes without processing the information. This method helps to collect more and close to real data.

The following information originates from *Measuring the User Experience: Collecting, Analyzing, and Presenting* by William Albert and Thomas Tullis.

What is User Experience?

- "User Experience includes three main defining characteristics:
    - A user is involved
    - That user is interacting with a product, system, or really anything with an interface
    - The user' experience is of interest, and observable or measurable" (page 4)
- Usability is the user's ability to carry out a task successfully using the product
- User Experience is all of the interactions the user has with the interface, including perceptions of the product created by the interactions.

What are metrics?

- Metrics are developed to quantify user experience outcomes in a reliable and consistent way.
- Metrics must be observable, quantifiable, and represent an aspect of the user experience in numeric format (p.7)
- Provide a sense of magnitude to the problems found with the user experience (e.g. should the product be delayed or should one aspect of the product be changed on a later date?)
- Meaningful metrics can be constructed from sample sizes as small as 8 -10 participants

Techniques on how to present UX conclusions:

- It's valuable to bring executives of the company to see the user experience first-hand as often as possible. If key decision-makers in the company see a pattern in the results, they will be more apt to follow recommended design changes. However, if they only observe once user experience test, they will assume that specific user is an outlier, so it's important that executives observe more than one test. (p.279-280)
- When presenting conclusions, include "short clips of two or three different participants encountering the same problem" to best illustrate a usability issue. Provide context on who the participant is before the clip, and make each clip about 30 seconds long, the more concise the better. Make sure to show reliable patterns within the clips of the user's experience. (p.280)

User Goals:

- Performance:
    - What does the user actually do when they use the product?
    - How well can a user complete a task or set of tasks?
    - Measures gauge performance:
        - Time it takes to complete each task
        - Effort it takes to complete each task (i.e. mouse clicks, cognitive effort)
        - Number of errors committed
        - Time it takes to become proficient in performing the tasks (learnability)
- Satisfaction:
    - What the user says or thinks about their interaction with the product
        - "It was easy to use"
        - "It was confusing to use"
        - "It exceeded my expectations"
    - Opinions on if the product is visually appealing
    - Opinions on if the product is trustworthy:

3 general classes of metrics to gauge UX:

- Task Success Measures - Can people complete the task?
- Efficiency - like task completion time, ease of use
    - How much effort is required to use the product
- Satisfaction:

        - Overall User experience
- Can also do combined metrics

Measure Navigation through task success

Lab Test:

- 5-10 participants
- One on one session between a moderator (usability specialist) and test participant
- Moderate asks questions of the participant and gives them a set of tasks to perform on the product in question

APPENDIX D: OUR TRIP TO THE WORCESTER ART MUSEUM

As part of researching the effectiveness of audio guides, we went on a tour of the Worcester Art Museum (WAM), which, founded in 1896, houses 38,000 exhibits. We decided to take the audio tour which involved an audio wand and an accompanying audio map at the cost of $2 per wand. If you don't want to pay for the wand, you can find the entire audio guide on the WAM website online. As far as the audio wand is considered, one has the option of placing it next to your ear but we found that in a crowded museum, one would hardly be able to hear anything. The other option is to use headphones as the audio wand comes with a 3.5 mm headphone jack. The accompanying map includes a path through numbered exhibits in the audio tour with information on which exhibits exist in which room, and on which floor. The audio tour is only available for the permanent exhibits which are marked by a headphone sign to make them easy to spot them in a room full of exhibits.

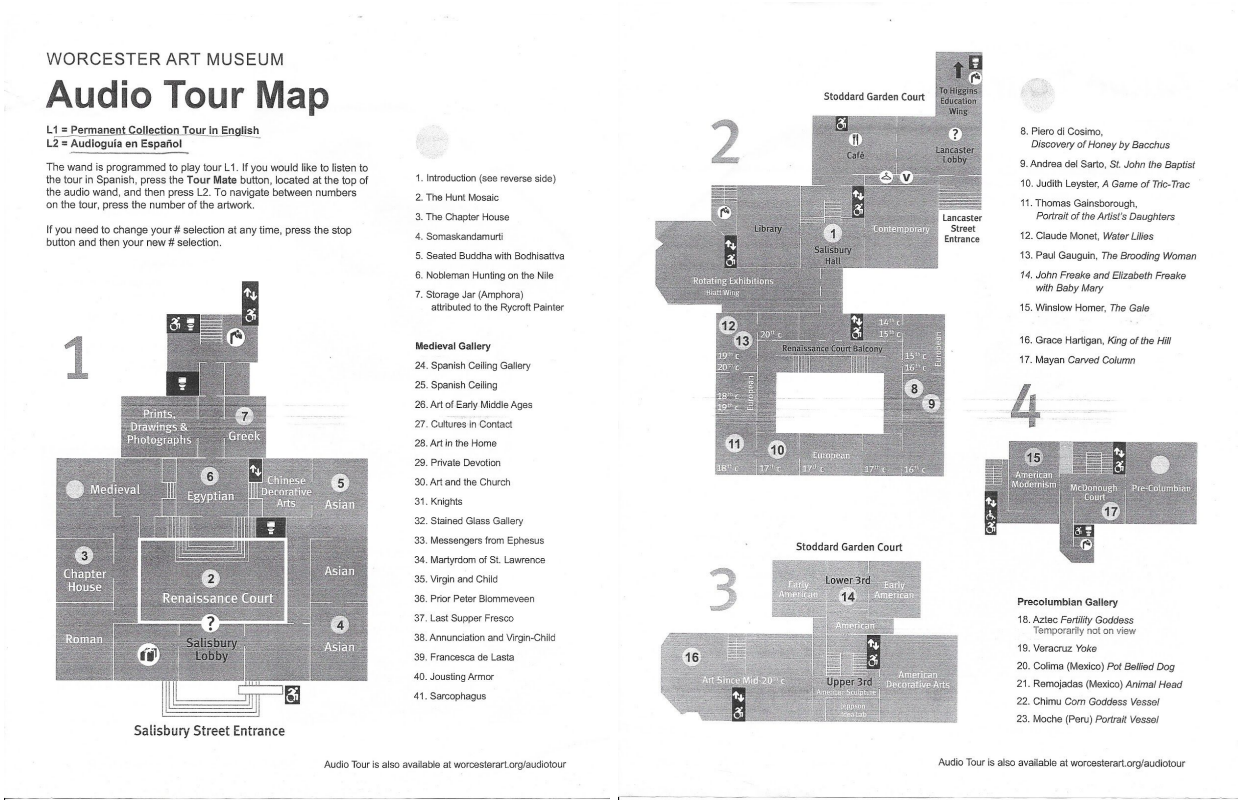


Figure 12: Audio Tour Map (Worcester Art Museum, 2018)

The audio tour begins with a short, concise and informative introduction about the history of WAM and the nature of the current exhibits. It also includes instructions on how to use the audio wand with the aid of examples, so one doesn't have to ask someone on how to operate it, which truly highlights the "self" in this self-guided audio tour. The speaker has very clear articulation and its is very easy to understand. You get a choice of two languages, English and Spanish, both

of which were very accurate translations of each other and convey the subject matter well. One issue with the audio wand is the lack of volume control which can get irritating in case the audio is too loud or inaudible. Another problem is that there is no option to pause the audio; you can only stop it and then have to begin from the start.

The content of the audio guide was very well thought out. It worked alongside written information at the exhibit but instead of just piling on information, it followed a narrative. In case of architectural exhibits like the Chapter House, the audio guide would begin by forming an image in the mind of the listener and taking them back in time so that they could imagine how the exhibit looked like in the old days. It builds the narrative in a way that you feel like you are there talking about things like how people would gather there and sit in rows of chairs and pray in front of a priest who presided over the congregation. It would also talk about the architecture of the exhibit and give information on it after directing you to the element that is being mentioned by using phrases like “look at that window” or “take a look at the ceiling”. A lot of work went into making this experience as immersive as possible.

In case of impressionist paintings, like the Water Lilies by Claude Monet, the speaker would give information about the style of painting and its history along with information on the life of Monet and how he painted this particular painting. They would also try to engage the listener by asking them to imagine… and to look at the painting and notice the subtleties of it being mention by the speaker. In case of Renaissance era paintings like Discovery of Honey, it again talks about the style of the painting and then about Renaissance and the historical significance of paintings during this era. It also goes ahead and explains the subjects of the painting and their cultural and religious significance. As we were going through the audio map, we wanted to look at a painting of Saint John the Baptist, but upon going to the room it was supposedly in, we found that it wasn't there anymore, suggesting that the audio map was out of date.

For all other kinds of exhibits, the audio guide would talk about the history of the exhibit, where it came from, the subjects of the painting, its symbolism, its historical, cultural and religious significance. The speaker was really engaging by asking the listener questions and asking them to imagine… The audio guide had a different speaker talk about each exhibit to make sure that the tour didn't get monotonous and boring and provided different perspectives at the same time. As mentioned before, this audio tour is only for the permanent exhibits but the speaker for each of these exhibits does recommend other temporary exhibits that are similar to them. This does take you out of the numbered tour but gives you an opportunity to learn more about a specific theme or part of history.

One of the best features of the WAM self-guided tour was a “Family guide” in the paintings section which were pamphlets with space for children to draw on, allowing them to be creative and actually be engaged in the history of the world. There were these “Art Carts” on each floor which are essentially mobile tables which children can use to draw on. The museum also has a virtual assistant that can be accessed via tablets in each room and can be used to teach

children more about the exhibits in a really fun way. The presence of such technology and resources makes the museum inclusive of children.

Figure 13: Art Cart (Worcester Art Museum, 2018)

APPENDIX E: INTERVIEW METHODS FROM BERG AND BHATTACHERJEE

Bruce Burg claims that interviewing contains a lot of similarities to performing, in that the manner in which you conduct your interview will draw different reactions and answers. This is useful in the act of *active interviewing*, in which the interview "is not arbitrary or one side", but rather similar to a conversation. But "before we decide the dramaturgical style that we wish to adopt for any given interview, we must select its basic type: the standardized interview, the unstandardized interview, and the semi standardized interview" (Berg, 2012, 12). For our project, we will be using the standardized interview for when we interview tourists, and the semi-standardized interview for when we gather information about the products functionality and conduct more formal background research with outside tour developers. The following four paragraphs are drawn heavily from Bruce Berg's *Qualitative Research Methods for the Social Sciences* and his chapter on interviewing (2012).

The standardized interview is conducted very formally, and is planned down to the wording of the questions. The questions are well thought out beforehand and as a unit act similarly to a survey. The semi-standardized interview is a bit less systematic than the standardized one. The wording specifically (such colloquial terms and slang) is adapted to the specific interview in order to decrease the formality. This form of interview generally acts more like the in between of a survey and conversation. The questions are a bit more dynamic, and adapt to the flow of the interview, rather than "sticking to the script", in case useful information could be gained through other questions and conversation guidance.

When preparing an interview, it is important to begin by listing out "all of the conceptual areas that may be relevant to the overall topic under investigation." From there, the questions can be formed. If you are performing a standardized interview, you also think about the specific wording at this beginning step. In a semi-standardized interview, you should leave room for potential off-topic segments of the interview and find places you can get back on track. From there you begin to think about the order of the questions; beginning first with the standards of the interviewee's profile, then working toward their thoughts and opinions on the subject you are researching. When doing this, it is important to also address topic changes within your questions and have transition lines such as: "Okay, now what I'd like to do is ask some questions about...". This ensures that your interviewee "is aware of what specific area he or she should be thinking about when answering questions."

On the subject of the style of questions, there are four different types: essential, extra, throwaway, and probing. Essential questions are the core questions that directly address "the central focus of the study" and are "geared toward eliciting specific desired information". Extra questions are ones that are similar to the essential ones but worded differently in order to both check the reliability of the responses and determine if the wording had any influence on the

answer. Throwaway questions are ones that aren't necessarily addressing the intention of the interview, such as demographics. They also can be used at the beginning of the interview to "develop rapport between interviewers and subjects", and also scattered throughout the survey to set the pace or change the focus. They can also be occasionally used to "cool" down a subject, by adding a bit of fluff between sensitive topics. Probing questions are a tool to draw out more information from a subject; common examples are "could you tell me more about that?" and "what happened next?". These are almost never scripted, and are called upon when deemed necessary by the interviewer.

When deciding on wording, it is important to appear neutral and unbiased in your questions when doing a standardized interview. Often interviewers won't even realize their questions have some sort of weight to them. In addition, the language used must be understandable to the subject. When conducting a large standardized interview a *"zero-order level of communications*" is used, meaning that the questions are simplified and blunt, leaving no room for unintended interpretations. It is also critical to avoid leading questions, and to avoid "double-barreled questions", meaning it asks the subject to simultaneously respond to two questions. Keeping questions short and precise is also good practice, as it ensures that the subject understands the question and isn't misinterpreting or forgetting part of it.

Anol Bhattacherjee gives his own take on survey research in his book *Social Science Research*. According to Bhattacherjee in the beginning of his Survey Research section, surveying was used as a research method as early as in Ancient Egypt. More recently surveying was pioneered as a formal research method by Paul Lazarsfield in the 1930 to 1940's. It is now a very popular quantitative research method in the social sciences.

Bhattacherjee explains that the studies the survey research method is best suited for are studies in which the unit of analysis is individual people. He also believes that the survey method of research has several strengths in comparison to other methods of research. Surveying is a great way to obtain unmeasurable data. Unmeasurable data is in reference to unobservable things such as human preference, traits, beliefs, behaviors, etc. Surveying is also ideal in collecting data about a population that is too large to directly observe. Also due to the ease of which surveys can be conducted and how economical they are, surveys are often preferred to other forms of research.

While there are many advantages to the survey research method, there are also some considerable disadvantages. One of those disadvantages is that surveying is subject to a large number of biases. These biases can include non-response, sampling, social desirability, and recall biases (Bhattacherjee, 73).

There are two broad survey method categories that depend on how the data is to be collected: questionnaire surveys and interview surveys. Questionnaire surveys can be mailed, group administered, or online surveys. Interview surveys must be conducted in person or by telephone. In his section about questionnaire surveys, Bhattacherjee gives them the definition: "A questionnaire is a research instrument consisting of a set of questions (items) intended to

capture responses from respondents in a standardized manner" (Bhattacherjee, 74). Questionnaires can either be structured or unstructured. The method in which respondents provide responses that are in their own words, otherwise known as "open ended responses", is called an unstructured survey. On the other hand, structured surveys give a set of responses for the respondents to choose from.

Bhattacherjee gives three types of surveys in his book. The three types of surveys mentioned are self-administered mail surveys, group-administered questionnaires, and online/web surveys. Self-administered mail surveys are where a questionnaire is mailed to many people and whoever is willing to respond fills the questionnaire out at their own convenience and sends it back in prepaid envelopes. The advantages to this method are that mail surveys are inexpensive to the administrator and they are unobtrusive. Unfortunately not many people respond to this method and tend to ignore survey requests. It may also be a long time before a response makes it back to the administrator. This method is not good for topics that need clarification or detailed responses.

Group-administered questionnaires are when a group of respondents gather at a common place and time and are asked to complete the survey during the gathering. The respondents do not interact with each other while entering their responses. This method is more convenient for the administrator in that a high response rate is guaranteed. It also gives the option for the respondents to ask clarifying questions about the survey if necessary.

The last method that Bhattacherjee mentioned is an online/web survey. These surveys are administered using the Internet. The questionnaires can be sent out via electronic mail request (email) either with a link to a website or the survey may be embedded in the email. This method is very convenient for the administrator as it is both inexpensive and the responses are recorded in an online database. Another perk to this method is that the questionnaire can be easily modified if necessary. Unfortunately the responses can be easily compromised if the survey is not password protected. There is also the issue of sampling bias since the survey cannot reach those without a computer or Internet access.

In his section about interview surveys, Bhattacherjee states that this method is a more personalized form of data collection than questionnaires. This method of surveying is conducted by trained interviewers using similar protocol to questionnaire surveys. Contrary to questionnaires, interviews are time consuming and research-intensive. Similar to the section on questionnaires, Bhattacherjee offers three types of interviews. The first and most common type of interview is a face-to-face interview. In this case, the interviewer directly asks the respondents questions and records their responses. Some respondents may feel uncomfortable, as these interviews are generally conducted in the respondent's home or office, but skilled interviewers may persuade respondents to cooperate. Their cooperation can dramatically improve response rates.

The next form of interview is called a focus group, or group interview. For this method, six to ten respondents are interviewed together in a common location. The interviewer leads a

discussion and make sure everyone has a chance to respond. This method allows for a deeper examination of complex issues as discussions often are a birthplace of new ideas. However, these groups are easily dominated by individuals with dominant personalities, making other individuals reluctant to voice their opinions. This method of research is generally used for exploratory research as opposed to explanatory research (Bhattacherjee, 78).

The third type of interview that Bhattacherjee mentions is telephone interviews. This method allows for interviewers to contact potential respondents by phone. The respondents are usually chosen randomly from a telephone directory. Voice capturing technology is becoming increasingly popular in this method of interviewing. Once respondents answer the phone, higher response rates can be obtained (Bhattacherjee, 79).

APPENDIX F: HOW TO ANALYZE DATA FROM FOCUS GROUPS

As previously mentioned, one of the interview methods we will be conducting is focus groups. Focus groups are a way of collecting a large amount of qualitative data at one time. There are a few ways to analyze the data that is gathered from a focus group.

There is a strategy that was developed by Glaser and Strauss (Glaser, 1978, 1992; Glaser & Strauss, 1967) called the *constant comparison analysis*. This method has three major stages. The data is grouped into small units in the first stage with a descriptor being assigned to each group. After the groups are made, they are put into categories. The third stage consists of the researcher developing themes that express the content of each of the groups. Using multiple focus groups allows for the researcher to determine whether the themes that emerge from one group also emerge from other groups.

Another method to analysing data from focus groups is *classical content analysis*. Similar to the *constant comparison analysis*, this method also includes putting data into smaller groups and assigning a descriptor to said groups. Instead of creating themes, these descriptors are placed into similar groupings and counted. There is a three-element coding framework in which there are three ways to use *classical content analysis* with the data (Morgan, 1997). First, the researcher can identify whether each participant used a given code, followed by whether each group used a given code. The third element is determining all instances in which a given code was used.

A third method for analyzing the data collected from focus groups is called *keywords-in-context*. The purpose of this method is analyzing the culture use of keywords (Fielding & Lee, 1998). People using the same words differently is a major assumption in *keywords-in-context,*making the examination of how words are used in context necessary. Due to the interactive nature of focus groups, the contexts within words is very important. According to Fielding & Lee, the *keywords-in-context* method involves contextualizing words that are considered central to the development of themes and theory by analyzing words that appear before and after each keyword, leading to an analysis of the culture of the use of the word.

APPENDIX G: METHOD FOR CREATING USER PROFILES

To create our user profiles, we will be generally following the method for creating user personas described in *About Face 3 The Essentials of Interaction Design* by Alan Cooper. Although we will be creating profiles based on usage trends, rather than creating personas, the method itself is very similar, with the biggest difference being the data included in the final product. A detailed description of Cooper's method can be found in Appendix A: Constructing Personas. We will be following customized versions of these steps:

1. Identify behavioral variables.
2. Map interview subjects to behavioral variables.
3. Identify significant behavior patterns.
4. Synthesize characteristics and relevant goals.
5. Check for redundancy and completeness.
6. Expand description of attributes and behaviors.

The first step to creating our user profile is identifying behavioral variables. Although we will be collecting data on demographics, the most effective profiles will be based on behavioral variables rather than demographics. We will identify the relevant behavioral variables based on the data we collect from the interviews. Cooper suggests that the most useful differentiations between users are found by focusing on the following types of behavioral variables:

Activities— What the user does; frequency and volume
Attitudes— How the user thinks about the product domain and technology
Aptitudes— What education and training the user has; capability to learn
Motivations— Why the user is engaged in the product domain
Skills— User capabilities related to the product domain and technology

A few of the behavioral variables we expect to find within our own project are: the amount of time spent at each site, total desired tour length (amount of time they want to spend), if they are travelling alone or in a group, technological capability, willingness to pay, and most of the questions in Appendix H. All of this data is quantifiable. Answers will all have a numeric value, or be true or false.

The next step is to map the users to the behavioral variables. For this, we will create scales for each variable and place each user somewhere on the scale. A user's absolute score in one variable does not matter so much as their score in relation to other users. For this reason, we will base the scales on the lowest and highest scoring users.

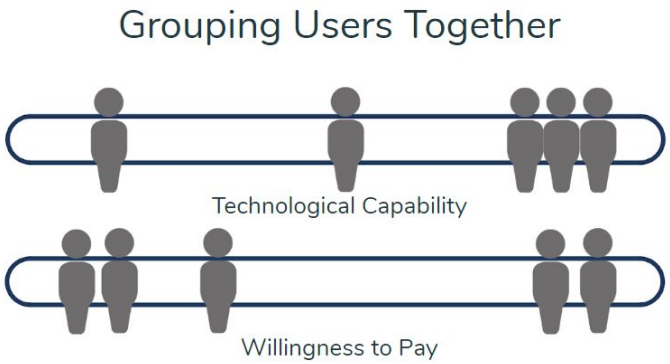


Figure 14: Example of Placing Users on Behavioral Variable Scales

For example, we predict that one of our behavioral variables will be ability to use the technology. We will begin our analysis of this variable by creating a quantifiable assessment of their ability. If it is viable with the technology, we will lay out each technological feature of the product. We will then give the user one point for each feature they were able to use easily. As Cooper says in his book, there is "often no good way to measure this precisely; you must rely on your gut feeling based on your observations of the subject" (2007). We will use our best judgement when necessary. Again, since we do not know how easy or difficult the product is to use, this will not be an absolute scale; it will range from the lowest score the users got to the highest. The important thing is that users are ranked relative to each other.

The next step is to identify behavior patterns. We will do this by looking for clusters of users that we observe in multiple variables. For instance, we may notice that a group of users is clumped together within the "interest in history" scale, and that the same group is grouped together on the "willingness to pay" scale and the "desired tour length" scale. If we see trends like this, as long as they are logical and not just coincidence, we can put these users into their own group. If there are enough similar variable scores within a group we can make a profile from the users.

Next, we will actually begin creating the profiles. We will synthesize characteristics of the profile based on the data we have about the users in the group. This will just be a few bullet points the profile's behavior with regards to the product. We will also give the profile a name, photo, and demographic details. Once the characteristics are established, we will derive the profile's goals with regards to the product. We will do this in two ways. First, we will do this by analyzing the behavior patterns, the logical connections between them, and the goals that lead to these behaviors. The other method we will use is analysis of goal-oriented interview questions.

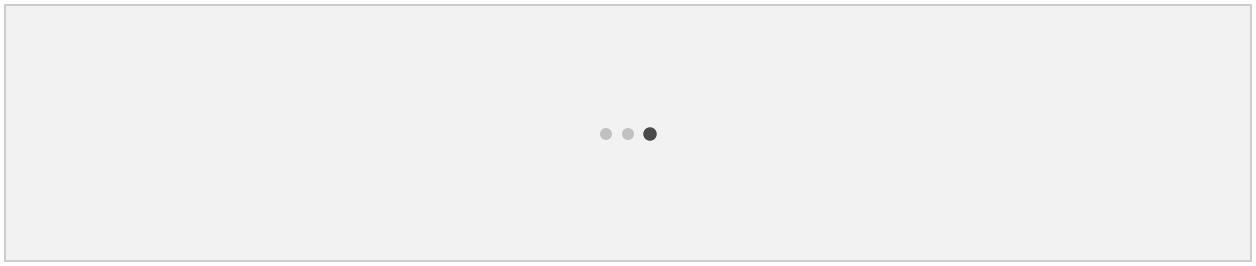
The next step will be to check for any redundancy or gaps in our profiles. This check includes merging any personas that are too similar, or identifying any information gaps. We may have to conduct more research if we have too many significant gaps.

Finally, we will expand all of the descriptions of the profile's goals and behaviors in order to make it easy to understand and relate to. The overall narrative will clearly show what the users who the profile represents are looking for in the product. It will include the background, goals, motivations, experience, a quote, and any other relevant information.

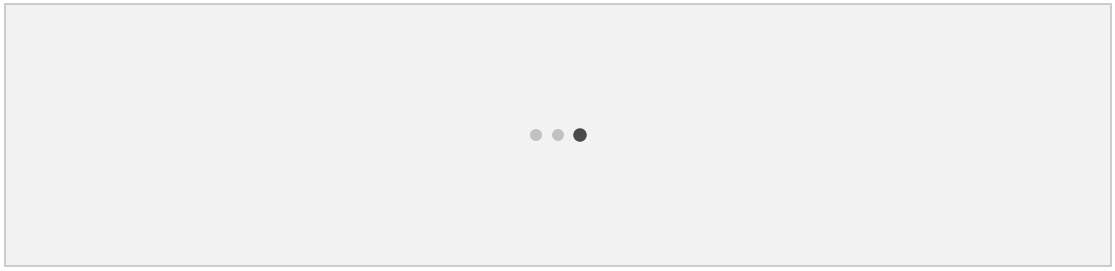
APPENDIX H: FORMS AND QUESTIONNAIRES

Appendix H1: Interview Questions for Sponsors

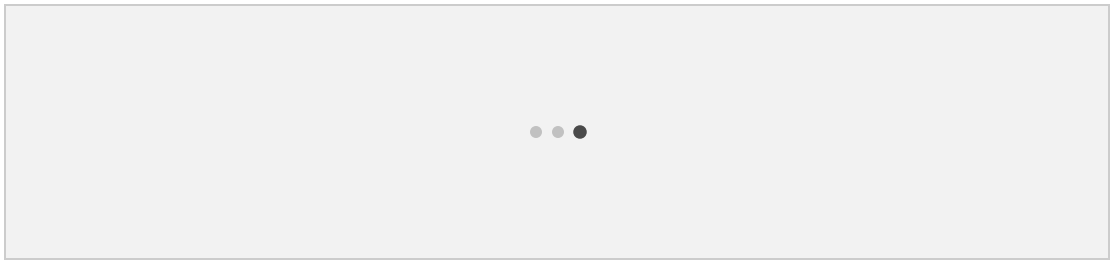
1. How will this product work?*



   a. What features does the product have?

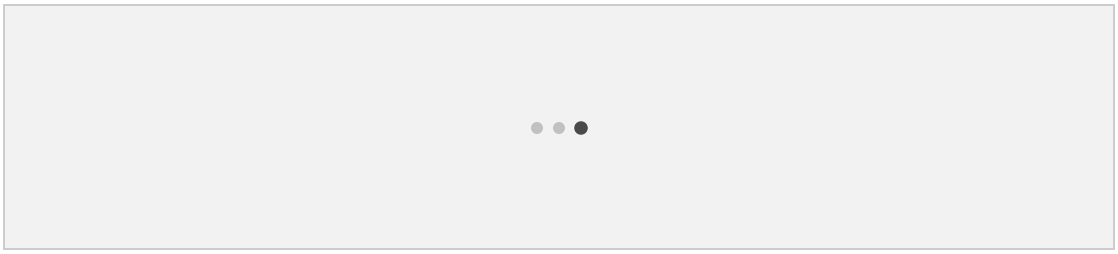


   b. How are they intended to work?

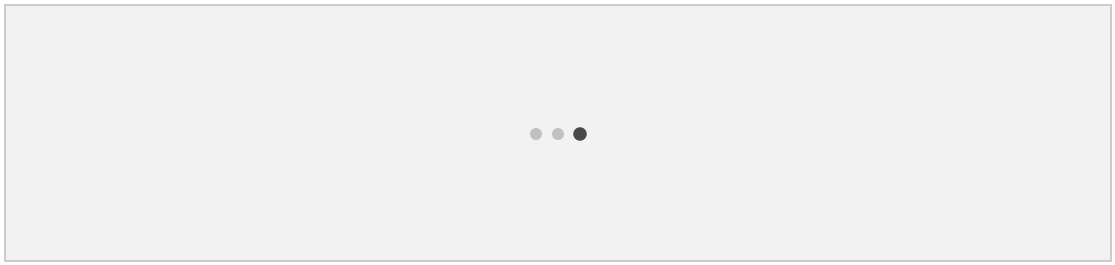


2. Do you have the ability to edit or expand the product?

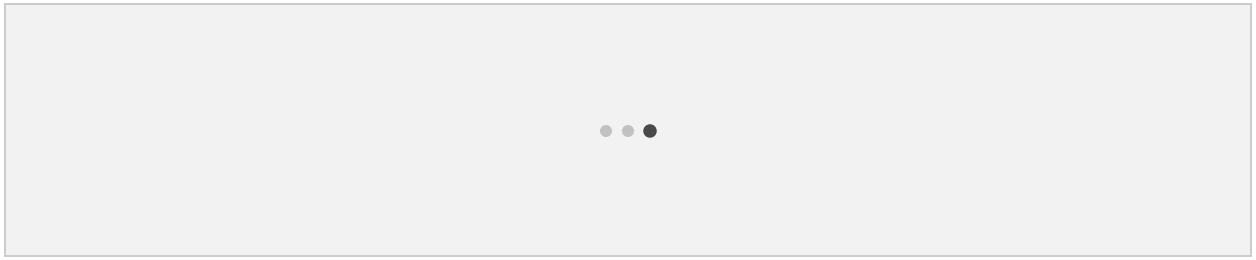
   a. The content?



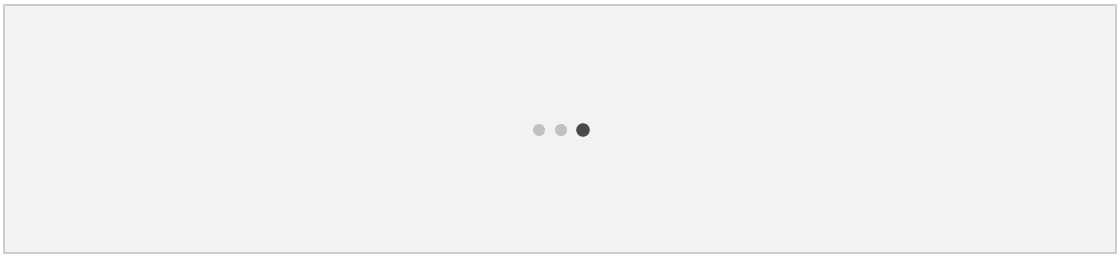
b. The technology itself?



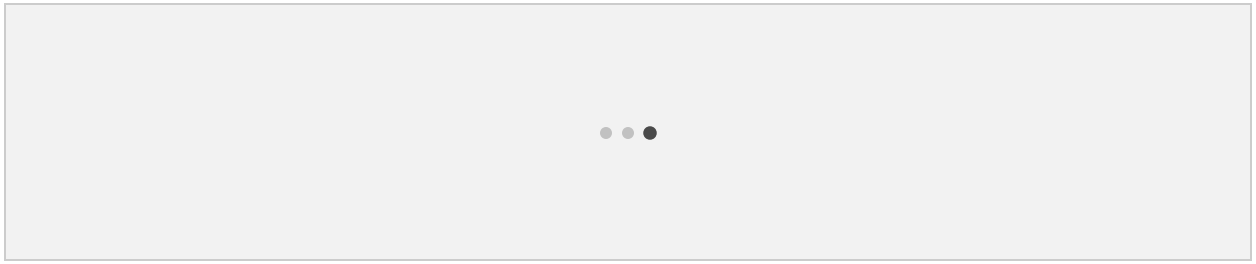
3. Is the path for the tour circular? (Would you end up back at the starting location?)



a. Do you have to go to each of the locations in a certain order?



4. Have you anticipated any problems?



Follow up interview with the sponsors:

- ***Will make these after we take initial tour***

Appendix H2: Focus Group Interview Questions

1. Age range

☐ Below 10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40

☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐ 61-65 ☐ 66-70 ☐ Above 70

2. Gender

☐ Female ☐ Male ☐ Prefer Not to Say ☐ Other

3. Country of origin

4. Rate your technological ability

Not Capable — Very Proficient

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. How well were you able to use the technology?

Not Able — Very Well

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Additional Comments

6. What did you think about the User Interface?*

Poorly Done — Well Done

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Additional Comments

7. How did you find yourself able to navigate the tour?

Not Able — Very Able

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Additional Comments

8. What did you think of the locations of the tour?

Poorly Done — Well Done

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Additional Comments

9. What did you think of the audio content?

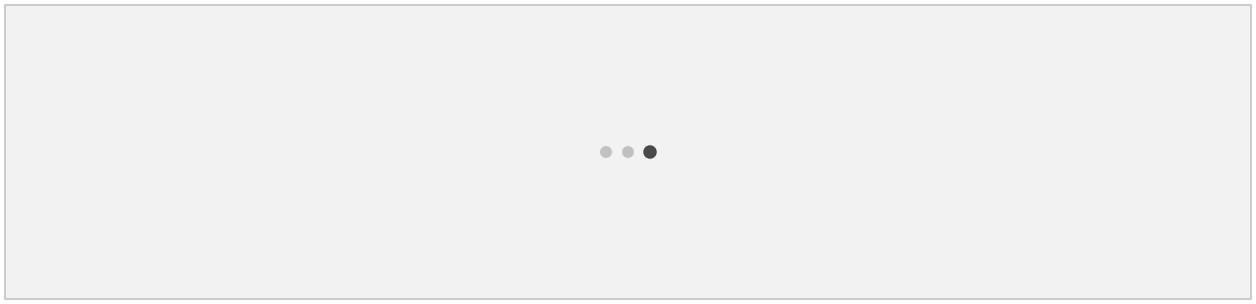
Poorly Done — Well Done

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

a. Were there any specific parts you liked or disliked about the audio?

Additional Comments

10. Is there anything you would change about this product?



11. Now that you have taken the tour, how willing are you to pay for this product?

Not Willing — Very Willing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

a. How willing are you to pay for main content?*

Not Willing — Very Willing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

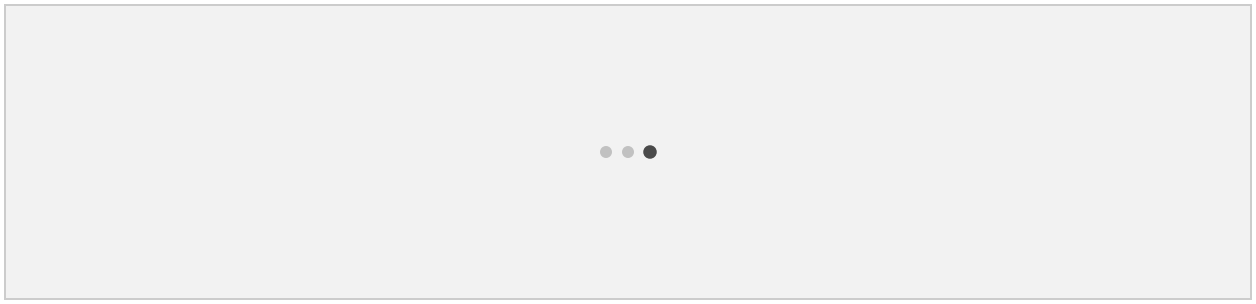
b. How willing are you to pay for digital souvenirs (such as photos with augmented reality or virtual tokens that track the places you visited on this tour)?*

Not Willing — Very Willing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

c. How much are you willing to pay for either?

Additional Comments



Appendix H3:Individual User Interviews

Pre Interview:

1. Age range

☐ Below 10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40
☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐ 61-65 ☐ 66-70 ☐ Above 70

2. Gender

☐ Female ☐ Male ☐ Prefer Not to Say ☐ Other

3. Country of origin

4. Rate your technological ability

Not Capable — Very Proficient

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. How familiar are you with the concept of an audio tour?

Not Familiar — Very Familiar

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

a. Have you taken one before?

☐ Yes ☐ No ☐ Maybe

i. If yes, how was your experience?

Very Poor — Very Good

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Additional Comments

6. How interested would you be in an audio tour that highlights “Hidden Wonders” of Kyoto?

Not Interested — Very Interested

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

7. How long would you like to spend taking an audio tour?

8. How willing are you to pay for this product?

Not Willing — Very Willing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

a. How willing are you to pay for main content?*

Not Willing — Very Willing

1 2 3 4 5

b. How willing are you to pay for digital souvenirs (such as photos with augmented reality or virtual tokens that track the places you visited on this tour)?*

Not Willing — Very Willing

1 2 3 4 5

c. How much are you willing to pay for either?

Additional Comments

Post Interview:

1. How do you feel about audio tours now?

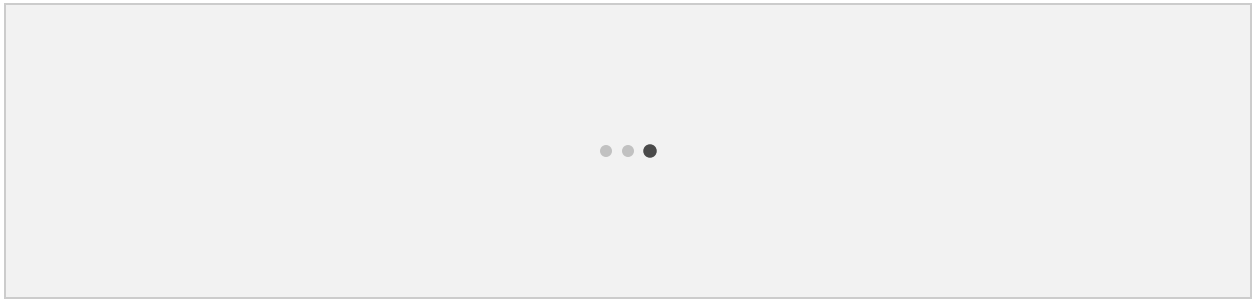
Not Good — Very Good

1 2 3 4 5

2. How much more, do you feel, you know about Kyoto now that you've taken the tour?

Nothing A lot More

Additional Comments



☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3. Now that you have taken the tour, how willing are you to pay for this product?

Not Willing Very Willing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

a. How willing are you to pay for main content?*

Not Willing Very Willing

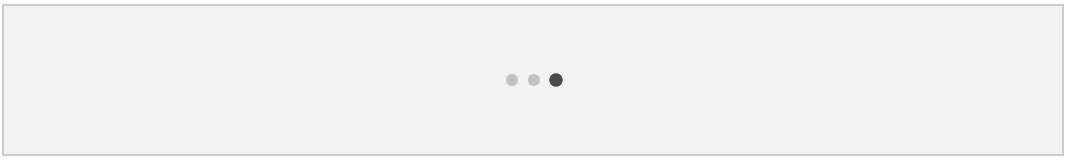
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

b. How willing are you to pay for digital souvenirs (such as photos with augmented reality or virtual tokens that track the places you visited on this tour)?*

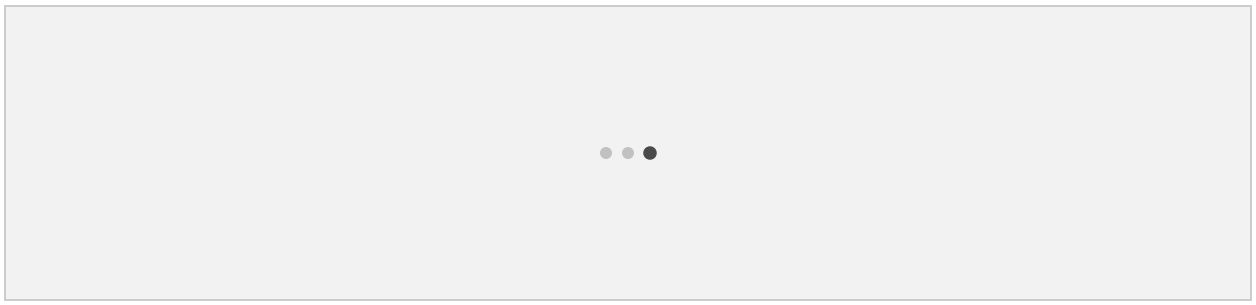
Not Willing Very Willing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

c. How much are you willing to pay for either?



Additional Comments



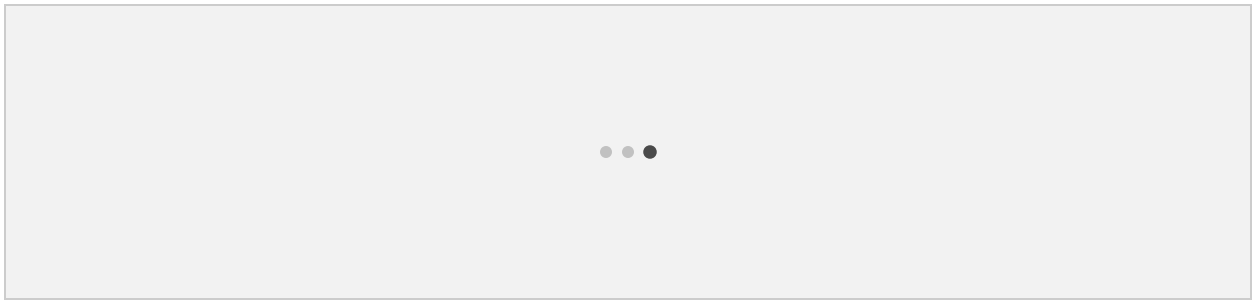
4. How well were you able to use the technology?

Not Able				Very Well
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. What did you think about the User Interface?*

Poorly Done				Well Done
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Additional Comments



6. How did you find yourself able to navigate the tour?

Not Able

Very Able

1 2 3 4 5

7. What did you think of the locations of the tour?

Poorly Done

Well Done

1 2 3 4 5

Additional Comments

8. What did you think of the audio content?

Poorly Done

Well Done

1 2 3 4 5

a. What did you think of quality the narration?

Poorly Done

Well Done

1 2 3 4 5

b. How appropriate was the volume setting?*

Too

Too

Low High

1 2 3 4 5

Additional Comments

9. Is there anything you would change about this product?

10. Would you recommend this product to other people?

Definitely Low Definitely Yes

1 2 3 4 5

Additional Comments

Appendix H4: Survey questions for tourists

1. Age range

☐ Below 10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40
☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐ 61-65 ☐ 66-70 ☐ Above 70

2. Gender

☐ Female ☐ Male ☐ Prefer Not to Say ☐ Other

3. Country of origin

4. Are you traveling in a group?

☐ Yes ☐ No ☐ Maybe

5. Rate your technological ability

Not Capable — Very Proficient

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6. How familiar are you with the concept of an audio tour?

Not Familiar — Very Familiar

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

a. Have you taken one before?

☐ Yes ☐ No ☐ Maybe

i. If yes, how was your experience?

Very — Very

Poor Good

1 2 3 4 5

Additional Comments

(Explain what the product is)

7. How interested would you be in an audio tour that highlights “Hidden Wonders” of Kyoto?*

Not Interested Very Interested

1 2 3 4 5

8. How willing are you to pay for this product?

Not Willing Very Willing

1 2 3 4 5

a. How willing are you to pay for main content?*

Not Willing Very Willing

1 2 3 4 5

b. How willing are you to pay for digital souvenirs (such as photos with augmented reality or virtual tokens that track the places you visited on this tour)?*

Not Willing | Very Willing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

c. How much are you willing to pay for either?

Additional Comments

Appendix H5: Field Sheet

User Interface

How legible is the text?

Not Legible | Very Legible

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

How helpful are the graphics?

Not Helpful | Very Helpful

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

How easy is it to navigate?

Very Hard — Very Easy

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Additional Comments:

Ease of navigation

How accurate was the map?

Not Accurate — Very Accurate

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

How clear are the directions?

Not Clear — Very Clear

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

How easy is it to navigate from one site to another?

Very — Very

Hard Easy

1 2 3 4 5

What did you think of the map route that was suggested?

Not Helpful Very Helpful

1 2 3 4 5

Additional Comments:

Site locations

How easy were the sites to locate?

Very Hard Very Easy

1 2 3 4 5

What did you think of the relevance of the sites?

Not Relevant Very Relevant

1 2 3 4 5

What did you think of the order of the locations on the tour?

Not Effective				Very Effective
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Amount of time spent at each site:

Additional Comments:

Content

How informative did you find the content?

Not Informative				Very Informative
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

How interesting did you find the content?

Not Interesting				Very Interesting
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

What did you think of the speaker's tone?

Monotonous				Very

Engaging

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

How easy was it to understand the speaker?

Very Hard — Very Easy

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

What did you think of the length of the tour?

Very Short — Very Long

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Did the tour make any recommendations of other sites not on the main tour?

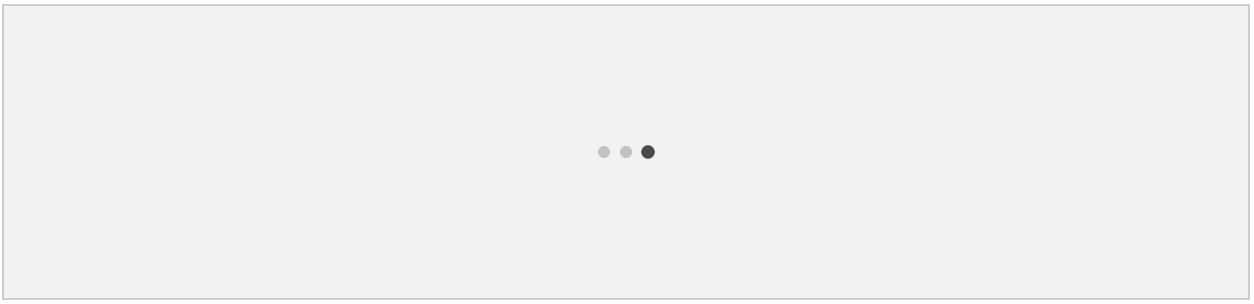
☐ Yes ☐ No ☐ Maybe

If yes, what did you think of those recommendations?

Not Helpful — Very Helpful

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Additional Comments:



Appendix H6: Consent Form

Study title	Determining market fit of Kyoto VR's product
Interviewers	Manas Mehta, Faith Kurtz, Henry Frishman, Olivia Hanson, Anthony Marge

We're inviting you to participate in a research study. Participation is completely voluntary. If you agree to participate now, you can always change your mind later. There are no negative consequences, whatever you decide.

What is the purpose of this study?
The purpose of this study is to determine whether the users like the product being developed by the Kyoto based technological firm, Kyoto VR, and what the users like and dislike about this product. The product is a mobile audio tour application that will take tourists through the hidden wonders of Kyoto.

What will I do?
All the participants will be asked to fill out a form with some personal information like their age, gender, country of origin and some information about their knowledge of audio tours and technological capability. They will then use the product by either going on an audio tour or just discussing what they think of it. They might be videotaped during this process. This discussion/audio tour will be followed by a post interview to record what the participants think of the product and if their views about audio tours have changed.

Risks

Possible risks	**How we're minimizing these risks**
Others in the focus group sharing your responses.	We ask all participants to keep everything said during the interview confidential. However, we can't control what others say, so it is best not to share anything you don't want others to know.

Breach of confidentiality (your data being seen by someone who shouldn't have access to it)	• Data won't be anonymous but the identifying information of the participants will be kept confidential. • We'll remove all identifiers after 2 months • We'll store all electronic data on a password-protected, encrypted computer. • We'll keep your identifying information separate from your research data, but we'll be able to link it to you by using a study ID. We will destroy this link after we finish collecting and analyzing the data.

There may be risks we don't know about yet. Throughout the study, we'll tell you if we learn anything that might affect your decision to participate.

Other Study Information

Possible benefits	Learn about what specific features users like about the product Learn about what features are hard to use or missing Learn about which kind of users like what about the product to help create personas
Estimated number of participants	80 - 100 tourists
How long will it take?	20 - 30 min
Costs	None
Recordings / Photographs	We will record you. The recordings will be used as user accounts of the research we have done and will be presented to Kyoto VR. The recording is optional.

What if I am harmed because I was in this study?
If you're harmed from being in this study, let us know. If it's an emergency, get help from 911 or your doctor right away and tell us afterward. We can help you find resources if you need psychological help. You or your insurance will have to pay for all costs of any treatment you need.

Confidentiality and Data Security
We'll collect the following identifying information for the research: name, gender, age, country of origin

This information is necessary to help create user profiles

Where will data be stored?	Personal Laptops of the interviewers.
How long will it be kept?	2 month

Who can see my data?	**Why?**	**Type of data**
The researchers	To analyze the data and conduct the study	Name, gender, age, country of origin and responses during the interview
The IRB (Institutional Review Board) at WPI	To ensure we're following laws and ethical guidelines	Name, gender, age, country of origin and responses during the interview
Anyone (public)	If we share our findings in publications or presentations	Responses during the interview

Contact information:

For questions about the research	Manas Mehta, Faith Kurtz, Henry Frishman, Olivia Hanson, Anthony Marge	kyotovr-IQP@wpi.edu
For questions about your rights as a research participant	IRB Chair - Professor Kent Rissmiller Human Protection Administrator - Gabriel Johnson	Email: kjr@wpi.edu Tel. 508-831-5019 Email: gjohnson@wpi.edu Tel. 508-831-4989
For complaints or problems	Manas Mehta, Faith Kurtz, Henry Frishman, Olivia Hanson, Anthony Marge	kyotovr-IQP@wpi.edu

	IRB Chair - Professor Kent Rissmiller Human Protection Administrator - Gabriel Johnson	Email: kjr@wpi.edu Tel. 508-831-5019 Email: gjohnson@wpi.edu Tel. 508-831-4989

Signatures

If you have had all your questions answered and would like to participate in this study, sign on the lines below. Remember, your participation is completely voluntary, and you're free to withdraw from the study at any time.

Name of Participant (print)

Signature of Participant Date

If participant is a minor or requires a Legally Authorized Representative:

Name of Parent, Guardian or Legally Authorized Representative (print)

Signature of Parent, Guardian or Legally Authorized Representative Date