EXPLORING THE POTENTIAL FOR MOBILE NEWS IN MUSEUMS

A CREATIVE PROJECT

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

MASTER OF ARTS

BY

MEGAN MCNAMES

JENNIFER GEORGE-PALILONIS – ADVISOR

BALL STATE UNIVERSITY

MUNCIE, INDIANA

JULY 2013
ACKNOWLEDGEMENTS

To my advisor, Jennifer George-Palilonis, for her inspiration, support, and dedication to excellence. The mantra, “What would Jenn do?” has kept me focused, organized, and committed to this project through its many challenges.

To everyone within the Department of Journalism who has supported me and rooted for me by asking, “How’s that project going?” I am happy to report once and for all that I have finished the project. 

And finally: To Anthony Smith, for teaching me how to love and nurture an idea.
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS

LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Museum professionals lack implementation knowledge and resources</td>
<td></td>
</tr>
<tr>
<td>Museum professionals lack the ability to create and maintain apps</td>
<td></td>
</tr>
<tr>
<td>Current solutions do not satisfy museum and visitor needs</td>
<td></td>
</tr>
<tr>
<td>Conclusions and approach</td>
<td></td>
</tr>
<tr>
<td>2. LITERATURE REVIEW: MUSEUM VISITORS</td>
<td>8</td>
</tr>
<tr>
<td>Visitors and the museum experience</td>
<td></td>
</tr>
<tr>
<td>Understanding visitors: Falk’s Visitor Experience Model</td>
<td></td>
</tr>
<tr>
<td>Learning and the museum experience: The Contextual Learning Model</td>
<td></td>
</tr>
<tr>
<td>Other visitor types: Archetypes</td>
<td></td>
</tr>
<tr>
<td>Capturing visitor attention: The Visitor Attention-Value Model</td>
<td></td>
</tr>
<tr>
<td>3. LITERATURE REVIEW: MUSEUM MOBILE EXPERIENCES</td>
<td>20</td>
</tr>
<tr>
<td>Mobile frameworks for museums: HCCI</td>
<td></td>
</tr>
<tr>
<td>Mobile paradigms: Multimedia content</td>
<td></td>
</tr>
<tr>
<td>Mobile paradigms: Guidebooks and wayfinding</td>
<td></td>
</tr>
<tr>
<td>Other mobile features: Experience documenting</td>
<td></td>
</tr>
<tr>
<td>Other mobile paradigms: Social media</td>
<td></td>
</tr>
<tr>
<td>Museum concerns</td>
<td></td>
</tr>
<tr>
<td>Building museum mobile experiences</td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td></td>
</tr>
<tr>
<td>4. CONCLUSIONS AND DESIGN IMPLICATIONS</td>
<td>44</td>
</tr>
</tbody>
</table>
Design conclusions: The experience

Design conclusions: The interface

Design conclusions: Content

New possibilities: News feeds and social participation

5. METHODOLOGY .......................................................................... 55

Design methodology

Project process

Usability testing methodologies

6. BODY OF THE PROJECT ................................................................. 64

Research

Conceptualization

Implementation

Suggestions for future iterations

7. SUMMARY AND CONCLUSIONS ................................................. 108

OUTSIDE EVALUATIONS ............................................................. 111

BIBLIOGRAPHY ........................................................................... 119

APPENDIX ....................................................................................... 129

1. Paper prototype instrument ...................................................... 129

2. Paper prototype transcripts ...................................................... 132

3. Digital prototype instrument .................................................... 169

4. Digital prototype survey instrument ......................................... 172

5. Digital prototype transcripts .................................................... 176
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>User-Centered Design Process</td>
<td>59</td>
</tr>
<tr>
<td>3.</td>
<td>Mind map of museum visitor research</td>
<td>65</td>
</tr>
<tr>
<td>4.</td>
<td>Mind map of research into the museum mobile market</td>
<td>69</td>
</tr>
<tr>
<td>6.</td>
<td>App sketches, showing a quiz and ranking system</td>
<td>80</td>
</tr>
<tr>
<td>7.</td>
<td>Sketches showing photo-centric design and information architecture</td>
<td>81</td>
</tr>
<tr>
<td>8.</td>
<td>Sketches showing a bookmark system and news feed with discussion questions</td>
<td>82</td>
</tr>
<tr>
<td>9.</td>
<td>Information architecture</td>
<td>83</td>
</tr>
<tr>
<td>10.</td>
<td>Wireframes for paper prototyping</td>
<td>84</td>
</tr>
<tr>
<td>11.</td>
<td>Screenshots of rapid prototype</td>
<td>91</td>
</tr>
</tbody>
</table>
CHAPTER ONE
INTRODUCTION

Museums are valuable community institutions, offering educational experiences to millions of visitors annually. In the United States, more than 17,500 museums, cultural centers, and zoos preserve history and promote learning in the arts and sciences, attracting 850 million visitors each year (American Alliance of Museums 2013). Research into museum visitorship suggests that although visitors may seek out museum experiences for different reasons, a desire to learn is an intrinsic motivation for nearly all visits made to museums (Falk 2009, 10). To meet this educational demand, museums employ a variety of interpretive strategies in their exhibits, including text labels, facilitated guides, and hands-on installations designed to facilitate self-directed learning (Bradburne 2008, x). Museums also have embraced digital interpretative tools like audio guides, videos, podcasts, games, and – more recently – mobile tools like smartphone guide books and multimedia tours (Tallon 2008, xiii). Digital media are important tools that can enhance visitor interaction by adding rich, authentic learning experiences to the free-choice environment in ways that would be extremely difficult through other media (Falk and Dierking 2008, 20; Gammon and Burch 2008, 35).

Although the majority of museum administrators agree that mobile tools are important to visitor engagement, most museums do not currently offer mobile experiences, and only one in 20 offers a smartphone guide book or multimedia tour (American Alliance of Museums 2012, 5). Because the museum ideal is visitor engagement, in which visitors are actively engaged in self-
directed learning through interaction with exhibit media, museums without mobile apps are missing a valuable opportunity to provide engaging interpretative resources (Bradburne 2008, x). Museum mobile tools facilitate inquiry activities such as exploration, information search, communication, and experience documenting (Hsi 2002, 1), and visitors benefit from the availability of multiple interpretive resources (Samis 2008, 14-15). Market research suggests that most museums are experimenting with mobile tools or plan to do so in coming years, but lack sufficient knowledge about mobile implementation as well as the funding and staffing necessary to populate mobile apps with content and to maintain them (American Alliance of Museums 2012, 19; "Museums and the Web" 2012, 39).

**Museum professionals lack implementation knowledge and resources**

Advances in technology have generally spurred advances in museums’ digital interpretive tools, and technology companies that were early adopters in the museum space often set the standard. In the 1950s, Acoustiguide helped museums adopt portable audio devices into the museum setting for interpretive purposes, just as those devices were introduced to the consumer market (Tallon 2008, xix). Today, Acoustiguide sets the North American standard for museum audio tour technology (Tallon 2008, xix), and museum professional and conference organizations such as Museums and the Web provide lists of standards for audio guides and conduct workshops for audio guide scripting and recording (Museums and the Web 2013).

Mobile app technologies have not yet experienced this kind of intense saturation or product definition in the museum market, and few museums or museum organizations publish or endorse standards for either mobile app platforms or content (Pocket-Proof 2013). Although research into mobile content over the past 20 years has suggested some standards for rich, mobile multimedia content, research into implementation has focused almost entirely on custom-coded
web and software solutions before the advent of the smartphone app. Museum professionals are hungry for information on mobile strategies and in 2011, 92 percent of museums reported an interest in case studies that explore mobile implementation in other museums (American Alliance of Museums 2012, 20).

Additionally, many museum professionals are unsure how to create mobile multimedia tours and guides or do not have the time and money to do so. A 2011 study by the American Alliance of Museums found that 71 percent of museum professionals reported a lack of technical knowledge as a challenge to implementing mobile technology; 91 percent of museum professionals also identified funding and staffing as challenges to implementation (American Alliance of Museums 2012, 19).

**Museum professionals lack the ability to create and maintain apps**

In 2012, professionals at both museums with apps and those without identified keeping mobile apps up to date and producing content as two of the three largest perceived challenges to offering their guests mobile experiences (American Alliance of Museums 2012, 39). The majority of museum professionals say they want to increase their in-house content creation to meet demand for mobile apps in the next two years ("Museums and the Web" 2012, 51). Museum professionals also indicate they are uninterested in developing and maintaining their own technology for museum tools, and prefer to outsource the wireframing, software development, and technical support of museum mobile projects (Tallon 2013, 13). This echoes concerns from 2011, when 71 percent of museum professionals surveyed about mobile technologies reported technological expertise as very or somewhat challenging to mobile implementation (American Alliance of Museums 2012, 19).
Current solutions do not satisfy museum and visitor needs

Several current solutions exist for museums that want to employ mobile tours and guides, but they fall short of fulfilling museum and visitor needs. The following list provides an overview of current solutions.

In-house digital teams

Some museums with adequate funding employ in-house digital teams capable of creating and populating mobile websites and custom apps for iOS and Android devices. The American Museum of Natural History notably invested $1 million into a wifi network in 2011 to support apps created by its in-house team (Brustein 2011).

Third-party design and development firms

Some museums employ third-party mobile app design and development firms like Pocket Proof, a museum mobile consultancy that has helped two-dozen museums build or improve their mobile experiences (Pocket-Proof 2013).

Open-source software

Several museums have created mobile tours with TAP, open-source software targeted toward the museum industry. Created in 2011 through a grant from the Institute of Museum and Library Sciences, TAP is a collection of open-source tools including a modified Drupal content management system that supports mobile websites and can be imported into a shell iOS app. TAP is limited to tour creation and focuses on way-finding by providing “stops” on tours set up by museum staff (Stein and Proctor 2010). According to the website Tapintomuseums.org, using
TAP tools requires knowledge of XML programming, and using TAP tools to create a mobile app requires additional knowledge of XCode, Apple’s iOS software development kit, and the Objective C programming language.

Commercial content systems

Acoustiguide, a long-time leader in museum audio tours, sells a content management system called Smartour that museums can use to present videos and images on mobile devices. By typing in numerical codes displayed prominently on exhibit materials, visitors can use a museum’s Smartour app to call up videos, image galleries, and a description of exhibit content. The Smartour system also provides:

- A map, with support for GPS
- A camera feature that lets museum goers take a photo, comment on it, and then post it to Facebook
- Museum hours
- Content categorization
- Social media share buttons for exhibit materials referenced in the app
- A “starring” system for marking interesting content

TourSphere, an up-and-coming museum mobile company, offers virtually the same features as the Smartour system but with the addition of visitor surveys (TourSphere 2013).

Market research suggests that the majority of museums cannot afford to spend money on in-house teams or these third-party firms, cannot divert staff time away from other activities toward mobile experience design and do not have significant technological know-how (American Alliance of Museums 2012, 19). Solutions such as open-source software and in-house teams are likely inaccessible to many museums due to their reliance on in-house software development and programming.

Current solutions also do little to present the kind of free-choice learning environment museums strive to create. The Contextual Model of Learning, a free-choice learning model
employed by museums, suggests that visitors learn when they have choice and control over their learning, interact with exhibit content, and communicate socially with other learners (Falk and Storksdiek 2005, 745). The model also suggests that a museum’s physical design is highly salient in motivating learners and museum goers to rely heavily on what they can see and do in the museum environment. Current solutions such as Smartour do not offer social communication and limit interaction with exhibit content to viewing mobile media rather than interacting with the exhibit content in the museum’s real physical space.

Additionally, museum visitor research suggests that visitors are motivated to attend museums for exploration, experience-seeking, social interaction, fulfilling hobbies or professional research goals, and relaxing. Academic research into mobile tools has found that mobile tools can facilitate exploration, information search, communication, and experience documenting, which satisfy the needs of visitors (Hsi 2002, 1). Current systems that museums can purchase such as Smartour and TourSphere do little to facilitate information search, communication, and experience documenting. Instead, they rely heavily on presentation of museum-supplied media. Although these systems are interactive in the sense that they allow non-linear access to media through manipulation of a user interface, they do little to facilitate visitor-to-visitor communication, facilitate information-search beyond information scripted by curators, and to document visitor experiences.

**Conclusions and Approach**

This creative project attempts to address the challenges faced by museums in the mobile app space and provide a case study for museum professionals. This project also explores the adoption of a content management system (CMS) that publishes to a mobile app as the solution to museum’s lack of implementation and technical knowledge. By using a CMS that publishes to
a mobile app, museum staff can organize available multimedia content with little technical knowledge and update the app as needed. This creative project also explores the adoption of news feeds and web content as an optional feature of the mobile app and a possible solution to museums staffs’ inability to regularly create and maintain content. News articles aggregated by keyword searches and Wikipedia articles fed into the mobile app can supplement museum content with free and updated content. Finally, this project implements an iterative, research-informed design process, resulting in the creation of a mobile museum app, which was tested for usability and evaluated by two outside reviewers.
CHAPTER 2

LITERATURE REVIEW: MUSEUM VISITORS

Visitors and the Museum Experience

Unlike the collection-driven museums of the past, today’s museums are visitor-centric and community-driven (Anderson 2012, 11). Modern museums seek to combine education and entertainment to create a visitor experience that engages people in free-choice learning environments (Falk and Dierking 2008, 75). Museums engage visitors in nonlinear, personally motivated, and self-directed learning through a variety of access points, including text labels, interactive kiosks, and docents (Falk and Dierking 2002, 9; Falk and Dierking 1992, 13). To serve the community beyond its walls, the modern museum’s educational offerings now employ digital media to extend beyond the museum visit and into the activities that take place before and after (Rudman et al 2008, 147).

Today, visitor research is the domain of museums’ audience development professionals, who seek to understand visitors by collecting demographic and visit data, as well as audience profiles and visitor satisfaction data from their respective museums. Drawing on audience development and visitor research from a wide range of museums across decades, several prominent museum professionals have sought to create more general models of museum visitorship.
Understanding Visitors: Falk’s Visitor Experience Model

Museum researcher and science educator John H. Falk suggests that the museum visitor experience is not something tangible, but rather a relationship between a visitor and a museum’s intellectual resources. To describe that relationship, Falk devised a model of visitor experience that categorizes visitors by their motivations for visiting a museum (Falk 2010, 488). His visitor experience model posits that visitors construct conceptions of what a museum experience affords, and then use that construct to justify their visit and create meaning from their visit experience (Falk 2010, 5). According to Falk, visitors base their conceptions of what a museum affords on how they perceive their own identities, and therefore their concepts of what museums offer arises from their own self-concepts. A person who self-identifies as curious, for example, conceptualizes the museum experience as a discovery-based experience that satiates her curiosity. She then justifies her visit as a way to discover new information at the museum and enacts her “curious” identity by seeking out what is novel and new about the museum and its content. She makes meaning during her visit when her visitor motivations are realized. The entire museum experience is therefore mediated by her own self-identity.

From his research, Falk developed a model of five visitor self-identities: Explorer, Facilitator, Experience Seeker, Professional/Hobbyist, and Recharger. In Falk’s model, the visitor goal of learning was so intrinsic to museums that it was considered to be present in each of the five visitor types (Falk 2009, 10). Each of the five categories represents a fundamental view by visitors of what identity-related needs the museum best supports, and the majority of visitors possess a clear, dominant motivation when visiting a museum, although they may adopt a different visitor type when visiting a different museum.

Falk’s five visitor types are:
• **Explorer:** Explorers are curiosity-driven. They see curiosity as a defining feature of their personalities and have a desire to seek out locations that enrich their understanding of the world. Explorers make meaning from their museum visits by relating to what they see and find interesting. During their visits, Explorers have “‘me’-centered agendas” and are likely to meander through the museum looking for something that interests them.

• **Facilitator:** Facilitators want to ensure that their companions attain their visitor goals. Facilitators are focused on what their companions see and find interesting and will let others, such as a child or spouse, direct the visit.

• **Experience Seeker:** Experience Seekers want to see the iconic exhibit at the museum and make memories. During their visits, Experience Seekers may rush the last part of a visit in order to “see everything.” Like Explorers, Experience Seekers are likely to meander through the museum waiting for something to attract their attention.

• **Professional/Hobbyist:** Professional/Hobbyists are adept navigators and rely on extensive prior knowledge and interest to focus their attention on artifacts or exhibits they want to study. Professional/Hobbyists enter museums with very specific, content-oriented goals.

• **Recharger:** Rechargers seek “restoration” experiences and respite from everyday stresses. Rechargers are interested in having peaceful or inspiring experiences and may be less interested in the actual content of a museum than other visitor types.

Falk’s emphasis on visitor self-identity underscores the personalized nature of museum experiences. Museum-goers judge the success of their visits based on the museum’s ability to
offer an experience they personally find relevant and rewarding. Museums that offer personalized experiences are held in higher esteem by visitors. Current visitor satisfaction surveys indicate the vast majority of museum visitors find their museum experiences very satisfying, which indicates that museum visitors have an accurate perception of what museums offer and are able to act out their self-identity during their visits (Falk 2009, 2831).

**Learning and the Museum Experience: The Contextual Learning Model**

When Falk proposed his Visitor Experience Model, he noted that the model itself was not enough to fully understand the visitor experience (Falk 2009, 461). Because the visitor’s experience is affected by specific events he or she participates in at the museum, Falk’s five-visitor types provide information about the characteristic trajectory of a museumgoer, but do not take into account the many smaller events of each experience that will result in a different learning outcome for each visitor (Falk 2010, 1624).

To further understand how visitors make meaning out of the free-choice learning environment of the museum, Falk drew upon constructivist, cognitive, and sociocultural theories to propose a Contextual Model of Learning and to provide examples of contextual learning in museums (Falk and Dierking 2008, 20).

The Contextual Model of Learning is not a true model, but rather a framework through which learning is conceptualized as an ongoing effort to make meaning in the world that is affected by overlapping, ongoing, and ever-changing contexts (Falk and Dierking, 2005; 745; Falk and Dierking 2000a, 12). Learning is the output of a lifetime of experience, built up layer upon layer (Falk and Dierking 2000a, 10).

According to the model, three contexts continually affect what and how people learn from different experiences: the learner’s personal, physical, and sociocultural contexts.
**Personal Context**

Learning is a personal experience that depends on a person’s individual abilities, experiences, and ways of thinking. New learning always occurs within the context of prior knowledge (Falk and Dierking 2000b, 32). Learning arises from appropriate motivational and emotional cues, is facilitated by personal interest, and is affected by the learner’s prior experience and understanding (Falk and Dierking 2000b, 16). People are motivated to learn when they perceive the learning environment as supportive and the learning activities as meaningful, have choices and control over their learning, and perceive the challenges of the learning tasks as appropriate to their skills (Falk and Dierking 2000b, 19).

**Sociocultural Context**

Learning is both an individual and group experience: Humans often make sense of the world through social interaction, especially in the museum environment (Falk and Dierking 1992, 38). At museums, visitors engage in social interaction with fellow visitors as well as with exhibit artifacts and media, which provide a form of social interaction between the content creators and the audience (Falk and Dierking 2000d, 51). Falk also proposed that learning takes place within a “community of learners” – a group such as a family who have experienced the same cultural upbringing and experiences and therefore have shared knowledge and experience (Falk and Dierking 2000d, 46).

**Physical Context**

People feel the need to act on the museum environment in order to make meaning from their experiences: What people see and do at the museum helps them to make sense of their museum experiences (Falk and Dierking 2000c, 54). Museumgoers automatically form memories
of events and places without deliberately memorizing them and are likely to recall their museum experiences by talking about what they did and saw at the museum (Falk and Dierking 2000c, 66). The physical context of the museum has a great role in guiding learning.

The Contextual Model of Learning provides insight into how visitors learn in museums, as well as what kinds of tasks visitors can undertake in museums in order to learn from them. The personal context suggests that personalization, choice, and control help visitors to direct their learning (Falk and Storksdiek 2005, 747). The sociocultural context suggests that visitor learning is supported when museum tasks allow visitors to engage socially with each other (Falk and Storksdiek 2005, 747). The physical context suggests that the museum environment is important to visitor learning. Museums should help orient visitors to museum content in order to expose them to exhibits and programs before, during, and after their visits (Falk and Storksdiek 2005, 747).

Other Visitor Models: Archetypes

In 2003, before Falk created his visitor identity model, cultural theorist and designer Valerie Casey compiled research into visitor motivations and visitor observations to create a model of six museum visitor archetypes intended to predict visitor behavior (Casey 2004). Casey’s research focused on how visitors conceptualize and travel the museum environment in order to interact with its content and other visitors, and her visitor archetypes reflect her emphasis on interaction with other museum visitors:

- **The Browser**

  The Browser enjoys browsing the museum’s offerings on an unordered path. To the Browser, the content of the museum is secondary.
• **The Greatest Hits Seeker**

The Greatest Hits Seeker wants to see "the best" works in the museum, especially any artifacts or exhibit material that is considered famous or important.

• **The Aficionado**

The Aficionado understands the museum environment and its strategies for engagement well, and has a broad and critical approach to the museum visit.

• **The Tourist**

The Tourist feels compelled to "do" the museum – to participate in whatever kind of experience a certain museum is perceived as offering.

• **The Analyst**

The Analyst is informed by a specialty, and is a student or professional in the field the museum content represents. The Analyst takes a deep dive, analytical approach.

• **The Socialite**

The Socialite enjoys social aspects of the museum and takes dates, friends, and family there.

Each archetype represents a different level of passivity and interaction with others and the exhibit environment, as well as their intentions of movement through the exhibit space (Casey 2004). While Falk’s visitor types provide valuable insight into the motivations of visitors who are seeking a personalized experience, Casey’s typology provide insight into visitors’ interactions with others and the museum space and is intended to inform decisions about the role
of technology in the museum. Casey used her six visitor types to inform the design of her “technocratic museum” – a virtual museum experience in which all visitors are tied virtually to a network on which they share insights and pose questions about museum content and in doing so, control the museum narrative and assign their own value to museum content (Casey 2004).

Capturing Visitor Attention: The Visitor Attention-Value Model

Psychologist and museum researcher Stephen Bitgood suggests that because learning is an outcome of visitor attention to interpretive materials, understanding how museum content captures attention is critical for successful interpretive design (Bitgood 2011, 2). In 2011, Bitgood and researchers at Jacksonville State University developed the Visitor Attention Continuum to examine how visitors’ attention is captured in the museum setting. Their model was derived from more than a decade of their own research, findings from other studies from the past 80 years, and contemporary research in psychology.

The Visitor Attention Continuum describes three consecutive steps responsible for visitor outcomes, including learning. The Continuum provides important design implications for museum exhibits. Because many museum professionals are concerned that mobile guides and tours may distract users from the museum experience, designing technology that successfully manages visitor attention is likely key to successfully employing mobile in the museum experience, as Bitgood suggests. Bitgood’s Visitor Attention-Value Model describes the processes of the Continuum’s three stages:

*The Capture Stage*

When visitors enter the museum, their attention is unfocused, and they are aware of a broad number of stimuli. Through either orienting or searching, visitors focus their attention. The
orientation process is one of distraction, in which visitors’ attention hones into a powerful stimulus such as a loud noise. In the search process, which is more goal-driven, visitors scan the exhibit environment for anything that is personally useful. Searching can be either sequential – examining one object after another until something interesting is found – or simultaneous.

There are five major factors that predict whether an exhibit element, such as an artifact or interpretive material, will capture attention. Museum stimuli that are distinctive, physically close to the visitor, organized in a sequential manner, powerfully distracting, or have highly perceived value are more likely to draw attention. Perceived value is defined as the ratio of usefulness divided by cost. Stimuli with perceived usefulness are seen as relevant, important, beneficial, or satisfying. If elements are perceived to be costly in time, effort, or monetary expense, visitors are unlikely to pay attention.

These factors hold several design implications. Most important is the notion that there is a constant competition among stimuli for attention, and managing how attention is sequenced through an exhibit requires knowledge of both the orienting and searching processes. Additionally, Bitgood recommends that interpretive devices such as audio tours be designed to allow visitors to manage their attention between exhibit and interpretive materials without constant switching back and forth, which can disrupt the orienting process.

The Focus Stage

After visitor attention has been captured, attention is briefly narrowed to a single object or element. Visitors must focus their attention on a single exhibit element for at least two to three seconds to be considered focusing. During the Focus Stage, attention is easily distracted and multi-tasking is difficult, if not impossible. Three major factors that are linked to the capture stage predict the likelihood of an exhibit object receiving visitor focus: organization, perceived
value, and distraction. Three additional factors predict the likelihood of an exhibit object receiving visitor focus:

- **Isolation**: Objects isolated from other objects are most likely to receive attention.
- **Contrast between object and background**
- **Focusing devices**: Physical devices, such as spot lighting or symbolic elements using language (such as asking the visitor to notice an aspect of a painting).

These factors imply a design that is sequential, and Bitgood suggests a guidebook or handout that can serve as a focusing device without increasing distraction. These factors also suggest that a design that instigates critical thinking about museum content can help focus attention.

*The Engage Stage*

In this stage, visitors engage with exhibit content and perform perceptual, cognitive, or affective processing (Bitgood 2011, 10). This is where personal interpretation, or meaning making, occurs. Bitgood identifies six major factors involved in this stage:

- **Perceived value**
  Perceived value appears to be the “most important predictor of engagement or involvement with an exhibit element” (Bitgood 2011, 11). A visitor’s interests and agenda are key to their assessment of usefulness.

- **Message Characteristics**
  Both the form of the message (including size of font and proximity of message to object) and symbolic factors, such as ease of processing, emotive quality, and readability, affect perceived value.

- **Action Tendencies**
Visitors’ reactions to an experience are informed by their prior experience. Visitors will consider current museum experiences through the lens of prior experience, informing their budgeting of time to the museum material, their persistence in responding to museum stimuli, and their patterns of interaction, such as reading or not reading object labels.

- **Physical and mental states**
  Visitors’ mental and physical energy level and feelings of stress could cause a distraction from exhibit content. However, some visitors exhibit the opposite effect, with the museum experience restoring their ability to engage attention. This phenomena is also described in Falk’s five visitor self-identities in the Recharger visitor type (Falk 2009, 10).

- **Qualities of the exhibit elements**

- **Distractions**

  In the Visitor Attention-Value Model, visitors’ personal preferences are the most salient aspect in attention-giving decisions (Bitgood 2010). This is likely the reason why the majority of museum visitors prefer to explore museums on their own, and dislike museum experiences in which museum docents or staff manage the experience and make choices about what is seen (Bubp 2010).

  To decide what they see, most first-time museum visitors, or those who visit museums only occasionally, begin their museum visit with three to 10 minutes of orientation, in which they determine where they are, what they want to see and where they should go (Falk and Dierking 1992, 58). They engage intensively with museum content for 15 to 40 minutes and spend an equal amount of time wandering the museum and engaging with only that which draws
their attention as they wander (Falk and Dierking 2012, 59). This suggests that museum visitor attention is only engaged intensively for about half of the visit. Because perceived value plays a role in all stages of visitor attention from the most engaged to the least engaged stages, Bitgood suggests that designers design interpretive materials so that visitors can make value judgments easily.
CHAPTER 3

LITERATURE REVIEW: MUSEUM MOBILE EXPERIENCES

Because the goal of museums is to support free-choice learning among visitors, and free-choice learning is affected by learners’ personal contexts, sociocultural contexts, and physical contexts, museum tasks that support personalization, control, and choice; social interaction; and orientation to museum content are likely the key to successful museum experiences. Mobile technology has a rich history of supporting some of these activities, beginning in the 1950s with the introduction of mobile audio technology delivered on portable cassette players, which helped to orient visitors to museum content by encouraging deeper study and providing context (Tallon 2008, xiii). This technology eventually grew to provide visitors with personalization, control, and choice by helping visitors to skip around within the tapes (Tallon 2008, xiii). In the modern museum, mobile technology takes many forms and often supports all of these activities through interactive experiences ranging from traditional audio tours to real-time Twitter debates and apps that present augmented reality 3D images. Because smartphones can deliver and manage large quantities of information and media, they have the potential to offer museum visitors personalized learning experiences in ways that previous technologies could not (Tallon 2008, xvii). For the past three years, museum professionals have looked to mobile technology to experiment in visitor engagement, increase the availability of interpretive content, and provide their visitors with a more interactive experience (Tallon 2013, 6).
Mobile Frameworks for Museums: HCCI

In the mobile museum, mobile technologies act as portals to visitor engagement – facilitating interaction between visitors and museum content and extending the kinds of activities that take place in museums. Mobile devices are especially adept at supporting free-choice learning environments because they are interactive, social, and capable of being used at every moment of the museum experience (Filippini-Fantoni and Bowen 2008). The devices feature interactive interfaces, and their ability to access a variety of tools and social networks creates further potential for interactivity between users, peers, and museum content.

The interactivity that mobile smartphone devices offer museum visitors occurs across four different levels, described by Yao-Ting Sung’s Human-Computer-Context Interaction Framework (HCCI). These four contexts are described below and shown in figure 1.

![Figure 1. The Human-Computer-Context Interaction Framework. Mobile tools can facilitate four levels of interaction between museum visitors. Mobile tool users interact with the mobile device, but they also use the mobile device to interact with objects, contexts, and other visitors.](image)
Visitor-Computer interaction

To use mobile tools, visitors must engage with interfaces. This represents the most basic level of interaction, which all mobile tools must offer in order to be usable (Sung 2010, 75). At this level of interaction, mobile tools do not extend free-choice learning tasks.

Visitor-Computer-Object interaction

Mobile tools encourage visitors to interact with mobile, digital materials in addition to the real content of museum exhibits. Mobile tools therefore have the ability to mediate interaction with museum content by calling attention to museum objects or providing additional information about objects (Sung 2010, 75). Mobile devices can help visitors orient their attention and can offer personalization, control, and choice over what kind or amount of information the visitor receives.

Visitor-Computer-Context interaction

Mobile tools not only engage users with museum content, they also can spur interaction between visitors and the context of the exhibit. For example, mobile tools may encourage visitors to consider how the perspective of the curator who put the exhibit together may have influenced its presentation or how visitors’ reactions to objects in the exhibit may vary from historical views of the same objects (Sung 2010, 75). This type of interaction can help visitors to think about the sociocultural context in which the objects are presented.

Peer-Computer-Context interaction

Many visitors to museums who use mobile guidebooks and multimedia tours report feelings of isolation (Gammon and Burch 2008; Sung 2010; Semper and Spasojevic 2002; Hsi
Mobile tools that encourage visitors to interact with other visitors can successfully mediate these feelings (Hsi 2003, 315) and encourage peer-to-peer interaction (Sung 2010, 75). Mobile tools can extend the sociocultural context in which museum visitors learn by helping visitors to connect with others as part of their learning.

Sung’s HCCI Framework provides important insight into how mobile technologies can enhance the museum experience, emphasizing that “the design and application of the mobile guidebook should encompass the context within a museum learning environment, including the visitors, the visitor’s companions, the exhibits, and the cultural or social meaning behind the exhibits” (Sung 2010, 75). His framework also emphasizes that technologies should support and extend users’ experiences in the real world. When presented without the mobile component, Sung’s framework describes a typical museum environment and the interactions that take place in it. To fit into the museum environment, mobile museum technologies should extend the experience by supporting the kinds of activities that take place in museums: free-choice learning, personalization, orientation, and social interaction.

Over the past couple of years, museum professionals have separated mobile technologies into two categories, each with its own contributions to the museum experience. Mobile tools that provide supplemental information about an exhibit or the museum itself make up one category; mobile guides that orient visitors through the collection or gallery space make up the other (Johnson et. al 2011).

**Mobile Paradigms: Multimedia Content**

At museums that currently offer mobile technology or plan to in the future, museum professionals envision that mobile technology will provide additional interpretation, create a
more interactive experience, and raise the profile of the institution ("Museums and the Web" 2012). Many of the high-profile, mobile offerings from museums in the past few years have been rich media smartphone and tablet apps (Brustein 2011), and research suggests museum professionals at other institutions are interested in following suit with their own content-rich offerings (Tallon and Froes 2011, 14).

Multimedia guides can play an integral role in enhancing interpretation within a museum by increasing both the amount of time visitors spend in an exhibit and their engagement with the exhibit (Proctor and Tellis 2004; Sung 2010, 81). Nearly 15 years of experimentation in mobile multimedia in museums provides a wealth of information on both its current abilities and potential (Filippini-Fantoni et al. 2011, 2). Successful mobile multimedia technologies have traditionally offered personalization, control and choice, and attention-focusing content.

*Personalization through choice and control*

Falk’s model of visitor types posits that visitors seek out museum experiences based on their own self-concept (Falk and Storksiedek 2005, 745). Furthermore, Bitgood’s Visitor Attention Value Model suggests that the most salient factor in capturing visitor attention is perceived value, and that value perceptions are judged individually (Bitgood 2011, 2). Museum professionals have sought to fulfill visitor demand for personalized experiences by providing visitors choice and control over what they see and do at the museum and by providing visitors with control over the level at which the information they encounter is presented (Rand 2004, 158-9). This kind of personalization is likely to aid in free-choice learning by addressing the personal contexts in which visitors learn.
“Visitors need some autonomy,” writes The Museum Group consultant Judy Rand in her Visitors’ Bill of Rights aimed at museum curators, “...freedom to choose, and exert some control, touching and getting close to whatever they can” (Rand 2004, 159).

Mobile multimedia offerings at museums are typically nonlinear in their presentation (unlike their podcast predecessors). Because smartphones excel at managing large quantities of information (Tallon 2008, xvii), mobile multimedia guides often allow users to select only the information they want to see. Mobile phones are by nature personal devices, emphasizing individual preferences (Dowden and Sayer 2007, 39). The Acoustiguide Smartour, a popular content management system for presenting video, audio, and text about museum artifacts, allows visitors to select only the exhibits they want to see more information about by typing in numerical codes for different exhibits, which can be found on artifact and exhibit signage.

In 2013, the Cleveland Museum of Art introduced an iPad app that allows visitors to select works of art from a 40-foot touchscreen wall and save them to a personalized tour, which they can view on an iPad (Bernstein 2013). For every piece of artwork that has been selected from the touchscreen wall and saved in a tour, a combination of videos, audio, and text are presented on the visitor’s iPad. The goal of this technology, according to museum director David Franklin, is to engage visitors, deepen their understanding of museum content, and to push interpretive materials into the digital realm so that the physical space of the museum can be presented with minimal decoration (Bernstein 2013). Although it is unclear how successful this example of control over what is seen and done will be, museum professionals from competing museums have already visited the Cleveland Museum of Art to learn more about the technology, and digital strategists in the museum industry are expressing excitement (Bernstein 2013).
At the Museum of Inuit Art in Canada, visitors scan QR codes with their mobile phones to access web pages with additional information regarding exhibit artifacts (Procida and Mausser 2012, 5). The use of QR codes allows visitors to see only the content they are interested in (Procida and Mausser 2012, 5).

The American Natural History Museum provides this control in a different manner: Guests can create their own tours on the museum’s Explorer app by selecting which exhibits they want to see and saving them in the My Tours section of the app (Perry-Lube and Lefkowitz 2011, 7). The app then organizes the selected exhibits into a walkable path and helps visitors get from exhibit to exhibit. According to researchers working on the app, educators are particularly aware of and enthusiastic about the My Tours feature (Perry-Lube and Lefkowitz 2011, 7).

Control over how information is presented

The Contextual Model of Learning posits that visitors approach learning materials with varying abilities and degrees of experience (Falk and Dierking 2000b, 32). Allowing visitors to choose information based on their specific needs and characteristics can help museum experiences appeal to different types of visitors (Filippi-Fantoni and Bowen 2008, 84). Museums have sought to give visitors control over the perspective from which information is presented and the depth at which it is presented in order to make museum concepts accessible to all learners and to promote learning (Rand 2004, 158).

When researchers at the Denver Art Museum discovered that visitors to their museum who considered themselves art novices were interested in learning about the human connections of art rather than the works themselves, they instructed curators to rewrite object labels to include more about artists, patrons, users, and viewers (Roberts 2004, 219). Museum staff also began employing human voices in their display material by including first-person written
testimony as exhibit artifacts (Roberts 2004, 219), a strategy used in many museums today to appeal to different types of visitors.

An early experiment into multimedia content conducted at the Tate Modern Museum in 2002 found that visitors with extensive prior knowledge about museum subject matter were less satisfied by the content of the experimental multimedia guide (which had been designed to be general) and reported they preferred more in-depth information (Proctor and Tellis 2003, 5). This highlights the need for hyperlinking to let visitors who are interested in learning more find more information quickly and easily. In a 2010 study of 31 museum visitors, the Smithsonian Institution underscored the need for hyperlinking in mobile apps, since visitors are used to using hyperlinks in their everyday computer use (“Smithsonian: Accessible Features for the Museums and Zoo” 2010, 22).

Attention-focusing content

Museum visitors using multimedia guides enjoy them the most when they enhance the visitor experience and synchronize with what they’re seeing at the museum (Bellotti et al. 2002, 38). Two strategies exist for constructing bridges between handheld and exhibit content: attention-focusing strategies such as prompts asking visitors to focus on materials and concepts and short, supplementary visuals and audio.

Short, supplementary visuals and audio

Multimedia guide users express a preference for easily digestible content such as images and short video and audio clips (Proctor and Tellis 2004; Bellotti et al et al. 2002; Sung 2010; Procida and Mausser 2012).
The Tate Modern Museum, when testing a mobile multimedia tour, found that visitors’ favorite aspects of the tour were audio clips that instructed them to look more closely at an exhibit object, commenting features, and video (Proctor and Tellis 2004, 4). Visitors did not like long audio or visual clips or the blank screens the Tate had built into its multimedia tour in an attempt to force visitors to look up from their screens at key moments in the exhibit (Proctor and Tellis 2004, 4). A study conducted in 2002 at Italy’s Costa Aquarium found that visitors using the aquarium’s mobile multimedia tour only enjoyed video clips that presented special information – when video clips were more generally focused, visitors preferred to pay attention to the real-world exhibit content instead (Bellotti et al. 2002, 38). Researchers concluded that audio content may be more practical for multimedia guides than video because it allows visitors to engage with both the multimedia tool and the exhibit content (Bellotti et al. 2002, 39).

Researchers testing a multimedia guide at the Exploratorium in San Francisco in the early 2000s also found that visitors preferred audio content to visual content (Semper and Spasojevic 2002, 10). Researchers theorized that audio content allowed visitors to continue engaging with exhibit content, while visual content such as images and video required visitors to alternate attention between the mobile device and the exhibit content (Semper and Spasojevic 2002, 10), a behavior that Bitgood warns against encouraging in his Visitor Attention-Value Model (Bitgood 2011). This alternation between the mobile device and the exhibit content was especially problematic in the Exploratorium, a science museum that features more than 400 hands-on exhibits that teach science concepts.

Attention-focusing prompts

Museum professionals fear that multimedia guides may distract visitors from the museum experience, and research shows that multimedia guides can in fact have a distracting effect
depending on their design (Bellotti et al. 2002, 38). Multimedia guides that help visitors orient themselves with the content presented at the museum are likely to create a bridge between the museum and mobile experiences without distraction (Bellotti et al. 2002, 38). In the Contextual Model of Learning, visitors’ ability to orient themselves in the museum environment affects their ability to learn (Falk and Storksdiek 2005, 747).

In multimedia guides, the use of questions that prompt visitors to focus their attention on museum content or explanations of how visitors can interact with museum objects is one strategy for orientation. This strategy, which museum professionals at the Exploratorium named ‘nomadic inquiry’ when they experimented with it from 2002 to 2005, is meant to motivate deeper engagement, suggest interactions visitors can have with museum content, and help visitors make real-world connections to what’s being presented in the museum space (Hsi 2003, 309). A majority of the Exploratorium’s mobile guide users surveyed in 2003 reported that the nomadic inquiry techniques motivated them to find new ways to interact with exhibits and prompted them to think more about the ideas presented via the mobile guide (Hsi 2003, 316).

Several multimedia mobile tours also have made use of problem solving to direct and orient visitors to museum content. In 2010, researchers at the Taiwan National Museum of History conducted experiments to compare visitor engagement and knowledge-acquisition between groups of visitors using the museum’s multimedia tour, which encouraged users to play the role of investigators solving a mystery with clues in the museum exhibit, and visitors not using the tour (Sung 2010, 76). From the experiment, researchers concluded that visitors using problem-solving skills to solve the mystery presented in the mobile multimedia tour were more engaged in the exhibit (Sung 2010, 81).
Mobile Paradigms: Guidebooks and Wayfinding

Multimedia guides are just one of the mobile paradigms museum professionals are interested in. Museum professionals say they also expect that mobile guides can help visitors navigate through the collection or gallery space (Johnson et. al 2011). In the modern museum, the museum experience is created not just by visitors’ interactions with exhibits, but also their use of gift shops, food courts, and museum resources like educational programming and after-school activities (Noordegraaf 2004, 231). Because navigation is a major challenge in large museums (Wecker et al. 2012, 3), several prominent museums have created mobile apps that focus on visitor wayfinding and promotion of museum programs to enhance the visitor experience through orientation rather than through content delivery.

Mobile devices that provide location-based services have been used since the 1980s to orient visitors within the museum, but the use of visitors’ own mobile smartphones for location-based services is a recent development (Wecker et al. 2011, 2-3). Many museums still struggle to create effective mobile wayfinding apps (Filippini-Fantoni et al. 2011, 2).

The main challenge of mobile wayfinding apps is facilitating navigation through the museum space. Providing overall museum information and marketing toward the public are secondary concerns (Wecker et al. 2011, 3).

Facilitating navigation

Wayfinding apps use maps and written instructions to guide visitors through the museum and its exhibits. Research suggests that visitors prefer low-fidelity maps as opposed to high quality maps (which may be visually confusing), and that a strategy that employs a mixture of both maps and textual directions will probably work best (Wecker et al. 2011, 4).
Some museums use WiFi triangulation and phones’ geolocation services to help visitors find exhibits and artifacts they are interested in (Perry-Lube and Lefkowitz 2011, 3). The American Museum of Natural History’s iPhone App, Explorer, uses a mixture of multimedia content and wayfinding features. The app uses the WiFi signal on visitors’ phones to route them through the museum with turn-by-turn textual directions and deliver multimedia content at destinations (Perry-Lube and Lefkowitz 2011, 3). According to the museum professionals who worked on the app, 80 percent of visitors using the app who were surveyed in 2010 rated their experience with the app as good or excellent and 87.5 percent said they would use the app on future visits (Perry-Lube and Lefkowitz 2011, 7).

At other museums, location-aware technology is out of reach due to technological limitations such as a poor WiFi network within the museum. The British Museum multimedia guide released in 2009 does not rely on location-aware technology due to budget, maintenance, and time constraints. Instead, the app uses an interactive map and provides textual directions that use level numbers and proximity to landmarks such as stairs, desks, and elevators as markers (Filippini-Fantoni et al. 2011, 3).

At museums with multimedia guides that make use of location-based content but are not location-aware, strategies for matching content to a visitor’s location include QR codes visitors can scan to call-out content, search functions that allow visitors to search for content based on location in the museum or content category, and keypads that allow visitors to type in exhibit numbers when they change exhibits and want to see the relevant content (Filippini-Fantoni et al. 2011; Wecker et al. 2011; Perry-Lube and Lefkowitz 2011).
Providing museum information and marketing the museum

Mobile technologies have become an increasingly useful tactic for marketing departments to promote a new collection or wing of a museum, and museum professionals hope that apps will entice the public to visit or make return visits (Johnson et. al 2011). Multimedia guides and wayfinding apps offer a more interactive peek at what is new at museums to drive interest in current and prospective patrons and ultimately, to drive more traffic to their physical spaces. Many mobile apps now tout new exhibits, provide events listings, and offer information about hours and admissions (Johnson et. al 2011). Receiving information in advance can help museum visitors to make meaning of their exhibit by helping to orient them with the museum’s physical context before and after their visit (Falk and Storksdiek 2005, 747).

Other mobile features: Experience Documenting

Museums deal in experiences, just as other businesses deal in commodities, goods, and services (Noordegraaf 2004, 231). Modern museums are interested in deepening visitors’ experiences by extending them beyond a single visit, to include pre- and post-visit experiences, which can help visitors to make sense of museums’ physical contexts and reinforce their learning experiences (Hsi 2005, 64). Providing apps containing multimedia content that people can download before their visit is one way museum professionals are facilitating pre-visit experiences. Bookmarking also can promote post-visit visitor learning (Hsi 2005, 64). Research on early mobile multimedia tours suggested that visitors were interested in bookmarking multimedia content for later study or reflection (Semper and Spasojevic 2002; Fleck et al. 2002; Bellotti et al. 2002) and critics of museum apps have suggested that features that let visitors save information for later study may be a successful strategy for building museum mobile experiences.
that do not distract visitors (Rothstein 2010). Museum visitors who use mobile tools are more prone to seek in-depth information after their visit than those who do not (Bellotti et al. 2002, 40).

**Other mobile paradigms: Social Media**

Objects in museums possess value because they have significant relationships (often historical) with people in modern society (Hooper-Greenhill 1992, 204). Many museums invite visitors to reflect upon the value of objects by sharing their own points of view with museums and other visitors (Roberts 2004, 221). Because learners engage with museum content in a sociocultural context, giving visitors the opportunity to participate socially can promote free-choice learning (Falk and Storksdiek 2005, 747). Although some museums do offer mobile experiences that are heavily social, many museum professionals have been concerned that mobile apps may do more to distract visitors from the social interactions that happen within museums than to engage them (Rothstein 2010). Recent research indicates that attitudes are changing, and museum professionals are opening up to the possibility of employing social media to facilitate visitor interaction and engagement (Horizon Report 2013, 16). Museums seeking a multimedia mobile experience can leverage social media technologies to help visitors contribute socially in three ways: through their contributions, through discussions with other visitors, and through social sharing.

*Contribution to social media*

Over the last two decades, museums have been experimenting with collecting visitor responses, through “Share your reaction” cards and other techniques that encourage visitors to think explicitly about how they value museum content and then to share their thoughts (Roberts
2004, 221). Some mobile museum technologies use the same strategy by giving users the ability to contribute their own stories and viewpoints.

The QRator project at the University College London (UCL) Grant Museum, for example, uses a custom application built for the iPad to give visitors a voice in the museum setting. Museum staff installed ten iPads in place of exhibit labels. Each iPad asks a different question seeking opinions on exhibit concepts. For example, in an exhibit about zoology the iPad presents a question about the ethics of domesticating animals and encourages users to type in their answer (Gray et al. 2012, 3). Visitors can download a companion app to their smartphones that allows them to see their and other visitors’ responses. Researchers archived contributions to the QRator iPads over nine months in 2011, and found that visitors were inspired to share their own experiences, resulting in a co-constructed, public interpretation of museum objects (Gray et al. 2012, 10).

Social sharing

Most museum professionals still see social media networks like Facebook and Twitter as one-way marketing opportunities (Fletcher 2010), and are reluctant to employ social media in the mobile app space (Tallon 2013). Most institutions lack the basic knowledge about social media necessary to develop a social media plan, and are confused about what domain (education, marketing, etc.) social media strategy falls into (Volgelsang and Minder 2011, 5-6). This is reflected in the current app offerings, as the CMSes commercially available like TourSphere and Smartour shy away from using social media for commentary and tend to offer social sharing instead (Volgelsang and Minder 2011, 6). Most CMS-based apps allow visitors to Tweet and Facebook share pre-written messages about app content that serve to advertise the museum.
Discussion

In studies of multimedia guides that existed before smartphone technology and social media, users reported feelings of isolation when using the guide (Sung 2010; Hsi 2002; Bellotti et al. 2002; Sung 2010). Researchers at the Exploratorium in San Francisco, which experimented with several different types of mobile technologies in the early 2000s, suggested that guides designed to support visitor conversation patterns could mediate feelings of isolation (Hsi 2002, 10). Social networking tools can create a sense of connectedness among learners, and engaging in discussions can inspire learners to reflect on subject matter (Siemens and Tittenberger 2009, 10). Public discussion of museum content helps museums create a publicly accessible interpretive environment with a diversity of voices (Gray et al. 2012, 10).

Although museum professionals are hesitant to open up their exhibit content to discussion, there is a small growing interest among museum professionals for this kind of social media usage and it is predicted to gain significant traction within the next year (Tallon 2013, 10; Johnson et al. 2012). Many visitors will make use of their social accounts to participate in museum-centered discussions when prompted (Gray et al 2012, 10). In a 2012 study on the use of Twitter in school group visits at the Museum of London, researchers found that students’ impressions, participation, and enthusiasm during their museum trip improved when they used Twitter to discuss answers to pre-written questions about what they saw at the museum (Charitonos 2012, 817). Furthermore, students did not report the feelings of isolation seen in early multimedia guide studies (Charitonos 2012, 809-10).

Museums that have implemented visitor conversation on mobile devices have used two strategies to ensure discussions are on-topic and family-friendly: moderating content on specialized software and relying on social media that already exists. At the UCL Grant Museum
in London, museum staff initially moderated comments that were made to the museum’s QRator mobile app, but users were confused when their comments did not appear instantaneously in the app (Gray et al. 2012, 5). To solve this problem, a pre-defined list of swear words was bundled with the application to filter out offensive content (Gray et al. 2012, 5). Another strategy for deterring unwelcomed comments is to make use of social media such as Facebook, which allows others to flag inappropriate content or Twitter, which shows user’s photos and bios (Vogelsang and Minder 2011, 5).

Wikipedia

Some museums have recognized the crowd-sourced information on Wikipedia as a credible source for information and used it in their mobile tools (Zlatos 2011). Museums, such as the Children’s Museum of Indianapolis, use an open source program called QRpedia that generates QR codes that direct visitors to Wikipedia pages on their mobile devices. Wikipedia is likely a strong contender for capturing visitor attention from a variety of visitor types because it presents information for both amateurs and professionals alike, allowing visitors to determine their own level of engagement by choosing which sections to read and which hyperlinks to follow (Zlatos 2011). Additionally, Wikipedia articles feature non-U.S. and non-Western viewpoints, capture world events within days or hours of their occurrence, and are copyright-free (Zlatos 2011). Wikipedia could give museum visitors the personalization, control, and choice they want, while offering information that puts museum content in a sociocultural perspective.
Museum Concerns

Current museum mobile offerings give insight into the concerns museum professionals have about mobile technologies. A review of the literature suggests some additional museum concerns:

Copyright and distribution concerns

Although some museum collections feature works old enough to have entered into the public domain, many creative works are still protected by copyright law. Some museum professionals are reluctant to post images and video of their collections in a digital forum, where they could possibly infringe artists’ copyrights. Google, anticipating copyright concerns, allows museum curators using its Google Art Project to leave out any images museum professionals do not want reproduced in the Project’s virtual tours of more than 150 museums around the world (Cohen 2012). Other museum administrators worry that reproducing museum content in the digital realm will encourage potential visitors to stay home and visit from the comfort of their living rooms (Bernstein 2013).

Accessibility

Whether they are private or public, museums are bound by federal law to maintain accessibility for visitors with disabilities (Disability Rights 2009). The Civil Rights Division of the U.S. Department of Justice suggests museums provide alternate formats for printed and audio material so they are available to the widest possible audience, regardless of sight or sound impairment (“Maintaining Accessibility in Museums” 2009). As part of their ongoing accessibility efforts, the Smithsonian network of museums – a leader in the museum field – offers captioning of exhibit videos, audio-descriptions for some exhibit content, and alternate
formats for publications and brochures such as Braille and CD versions (“Smithsonian: Accessible Features for the Museums and Zoo” 2013).

Accessibility features come standard on smartphone operating systems, although they may not work in some apps. iPhones, for example, support multi-sized fonts and zoom levels, VoiceOver (a screen reader capable of reading screen content and button labels to the user in 21 languages), and closed captioning, but not all apps support these features (“iPhone: Accessibility” 2013). Android systems feature a screen reader, but other accessibility features vary between devices from different manufacturers (“Developer Docs: Accessibility” 2013). Museums should consider how their mobile smartphone apps can interface with smartphone accessibility features or can offer their own accessibility features.

Tracking

Museums typically engage in visitor tracking through technology such as RFID tagging (asking visitors to wear an RFID device as they travel the museum) and non-technical means such as exit surveys (in which staff or volunteers collect information as visitors leave exhibits) (Bickersteth and Ainsley 2011). Data gleaned from this type of visitor research is often used to inform changes to current exhibits or the design of new exhibits (Bickersteth and Ainsley 2011). WiFi has been employed in some museums to locate visitors via their mobile phones in order to understand where visitors frequently travel in the museum, and museum professionals have advocated mobile tracking as an effective way to understand visitors (Bickersteth and Ainsley 2011). Commercially available CMSes such as TourSphere collect usage information for museum professionals.
Building Museum Mobile Experiences

Museum professionals are looking for help to design and build mobile technologies for their museums. Most professionals report that content-creation and management, project planning, marketing, and distribution are primarily in-house tasks, while they expect interaction design, software development, and technical support to be out-sourced (Tallon 2013, 13). Museum professionals also want to offer mobile experiences on multiple platforms such as the iPhone iOS and Android systems (Tallon 2013, 11). When it comes to building mobile apps, some museum professionals do create their own with custom code, while others use open-source code, use content management systems, or hire third parties.

In-house digital teams

Some museums employ in-house digital teams capable of creating mobile technologies – the American Museum of Natural History and the Smithsonian Institution serve as high-profile examples. The average iOS app costs $35,000 to make (Burnette et al. 2011, 13) and 91 percent of museums offer them to visitors for free (Tallon 2013, 15). Museums expect their apps to have a shelf life of just 2 years (Tallon 2013, 17). Museum professionals report they are not interested in designing and developing apps in-house, although they are interested in managing digital projects and creating and maintaining digital assets (Tallon 2013, 13).

Third-party design and development firms

Mobile app design and development firms such as Pocket Proof build custom mobile apps for museums across the globe (Pocket Proof 2013), although it is unclear how popular this solution is in U.S. museums. Pocket-Proof lists two U.S. museums in a list of clients on its website and prices for their services are not publicly available.
Open-source software

Anticipating future market segmentation in the museum mobile space in 2010, digital strategists at the Indianapolis Museum of Art created an open-source metadata standard for museums to bundle content for mobile apps (Stein and Proctor 2011). By creating a common language, TourML creators hoped that museums could bundle their content into tours that could be imported and exported between a variety of mobile app vendors, giving museums the ability to change vendors and adapt to new technology (Stein and Proctor 2011). Currently, museum tours created with TourML can be exported to a modified Drupal content management system that supports mobile websites and a shell iOS app. The Drupal CMS and shell iOS app are available online and branded under the name TAP. The standard is currently limited to tour creation, and focuses on way-finding by providing “stops” on tours set up by museum staff. According to the TAP website, using the TAP tools requires knowledge of programming using XML, and using TAP tools to create a mobile app requires additional knowledge of XCode, Apple’s iOS software development kit, and the Objective C programming language.

Commercial content systems

Museums can buy or subscribe to mobile content management systems for mobile app creation. One of the most ubiquitous content management systems available for museums interested in creating mobile multimedia guides is the Acoustiguide Smartour system, which helps museums manage and publish apps with images, text, audio, and video. By typing in numerical codes displayed prominently on exhibit materials, visitors can use a museum’s Smartour app to call up videos, image galleries, and a description of exhibit content. The Smartour system concept revolves around multimedia – with some support for social sharing. Its
competitor, TourSphere, is a bit less specific in its aims, giving museums the opportunity to create pages with a variety of content such as video, audio, text, and polls. Museums can layer information by creating subpages. In the National Underground Railroad Freedom Center’s TourSphere app, for example, a page about a slave pen that has been reconstructed inside the museum features an image of the pen with a caption. Underneath that, users can choose between six buttons presenting six different videos related to the artifact.

**Barriers**

While the majority of large museums (250,001+ annual visitors) now offer mobile experiences of some sort including audio tours and smartphone apps, only about a third of small and medium-sized museums (250,000 or fewer annual visitors) currently offer any museum mobile technology (Tallon 2013, 5). About a third have plans to introduce mobile technology in the future. Museum professionals cite content concerns as the most pressing barriers to mobile app creation and a lack of funding, staff, and technological know-how as additional concerns (Tallon 2013; American Alliance of Museums 2012).

**Content and Updating**

The three most challenging aspects of creating a mobile app, according to museum professionals, are obtaining the resources required to build and sustain the mobile experience, obtaining the resources required to implement the mobile experience, and keeping the content up to date (Tallon 2013, 18). A survey of museum professionals from 2011 found that about half of museum professionals thought creating content for mobile experiences was very or somewhat challenging (“2011 Mobile Technology Survey" 2011, 19).
The museum mobile CMSes currently on the market such as Smartour and TourSphere address these issues by offering easy-to-use CMSes that allow museum staff to easily arrange and update app content in a self-sustaining system. However, these systems require that museum staff have content or can pay for content and can regularly produce content to upload to these systems. This largely prevents museums without the ability to create videos, text, images, and audio from using these systems, or forces museum professionals to create Smartour and TourSphere apps that leave out exhibits that lack associated digital content. Some museums house exhibits with plenty of assets for a mobile experience alongside other exhibits for which multimedia assets do not exist. These CMSes do not address this issue. Current mobile solutions also ignore the potential for social networks and web content to populate or enhance the multimedia environment.

Funding and Staffing

The average app costs $35,000 to develop (Burnette et al. 2011, 13). Museum professionals expect apps to have a life cycle of about two years before they are out of date (Tallon 2013). In a 2011 survey on mobile technology implementation, 91 percent of museum professionals reported funding and staffing as very challenging or somewhat challenging in the mobile app space, with 59 percent reporting their institution had no budget whatsoever for mobile technology (“2011 Mobile Technology Survey” 2011, 19).

Technology

The majority of museum professionals are interested in hiring third parties to deal with the wireframing, technology, software, and tech support aspects of app development (Tallon 2013). In 2011, 71 percent of museum professionals identified technological expertise as a
challenge to mobile technology implementation at their museums (“2011 Mobile Technology Survey” 2011, 19).
CHAPTER 4

CONCLUSIONS AND DESIGN IMPLICATIONS

It is clear that museums are looking for innovative mobile solutions that support and extend the kinds of activities museum visitors engage in such as personalization, orientation, and social interaction, but do not increase the burden on their staffs and budgets and do not distract visitors. Because mobile museum technologies must engage visitors actively in the museum experience, it is likely that the most engaging mobile technologies will remain those that are custom-built for specific collections or exhibitions, such as the AMNH Explorer app. Custom building an app gives museum professionals the opportunity to mirror the physical experience with the digital experience as much as possible through novel use of smartphone features. At the same time, it is likely that due to their cost and short life cycle, custom apps are out of the realm of possibility for many museums. Content management systems stand out as an attractive option for museum staff – they allow museum staff to populate systems with content with little technological know-how, can be updated by the museum at will, and are typically lower in cost than other solutions. But because the needs of museums are varied, and strategies for engagement are similarly diverse, any CMS technology that attempts to provide a mobile solution to many museums must be flexible, offering spaces for opportunity rather than a rigid set of features. Choice and customization are likely as important to museum staff creating mobile experiences as they are to visitors at the museum.
Current content management systems do a good job of sharing content – both the Smartour and TourSphere products for example allow museums to share images, video, audio, and text and to publish to mobile websites or native apps. Both allow visitors to share the app content on social media sites and to collect usage information. But none of these systems solve the content problem for museums that have little content to share on a mobile device or few resources to create new content specifically for the app. They also do not solve accessibility issues by offering transcripts of video and audio. Finally, none of these systems seek to mediate the feelings of isolation that mobile guide users feel by encouraging interaction with other visitors. Visitors using these systems can publish content to their social media feeds, but the systems do not have any mechanism in place to allow visitors to enter into conversations and to co-construct a public interpretation. These systems are great for the museum mobile projects of today, but they are not forward-looking when it comes to opening interpretation up to a diversity of voices. Their reliance on multimedia content creates mobile apps that are largely only interactive in the sense that their interfaces are interactive and content can be viewed in a non-linear fashion.

**Design Conclusions: The Experience**

Clear design implications arise from a review of the literature and current museum mobile offerings. The museum ideal is visitor engagement through free-choice and self-directed learning: Any mobile technology must support this by offering an interactive environment that presents value for a variety of audiences and bridges the gap between the physical and digital. Visitors learn from museums by undertaking tasks in three contexts: the personal, sociocultural, and physical. Museum mobile technologies should support tasks within these contexts.
Personalization, control, and choice

The experience should allow for self-directed learning through choice and non-linear access to content. The experience should stimulate critical thinking about museum content and contexts, as suggested in Sung’s HCCI Model. App content should be personalizable in terms of the level of participation in the app, the level at which content is presented, and the order in which content is presented. The user should feel that no matter which of Falk’s five visitor roles he or she is enacting, the mobile app will fulfill expectations and support museum visit activities. For example, Professional/Hobbyist type visitors should not abandon the app because its content is too general, or because they cannot figure out how to access more in-depth information. At the same time, Rechargers should not be overwhelmed by the amount and depth of content. The most salient factor in capturing visitor attention is perceived value (Bitgood 2011, 11); a mobile app must appeal to a diverse set of values.

Orientation

The experience must be one of orientation, not distraction. The mobile app must help visitors to orient themselves when they first arrive to the museum and to orient their attention toward museum content and concepts, focusing their attention and helping visitors to manage their attention. The app should employ strategies such as questions that guide attention or hone observational skills or discussion of museum concepts. The app should help visitors to orient themselves before and after their museum visit.

Social interaction
The mobile experience should allow for digital social interaction to increase visitor engagement and learning. Because many museums are hesitant to allow guests to comment in the app without a moderation system, other types of interactivity that promote social interaction or may spur conversation should be explored. Polls and other forms of data collection that allow visitors to compare their responses to the responses of others could be used. Digital social networking activities such as shared curation (sharing links, recommending articles) could be explored. To ease fears of unwanted comments, integration with social media like Facebook and Twitter could allow guests to share their experience in forums that are already somewhat moderated through flagging of inappropriate content and association with visitors’ personal social media accounts. The mobile experience also could trigger social interaction through discussion questions or prompts aimed at groups of visitors, which the visitors can answer by talking to each other.

**Design Conclusions: The Interface**

All interactive systems require interfaces, which provide them with a look and feel suited to their purposes (Cooper 2003b, 92). Because museum mobile apps should not distract users, it’s imperative their interfaces meet usability standards to facilitate user goals.

Sung’s HCCI model provides a framework for understanding the types of interactions technology can facilitate between visitors and museums (visitor-computer; visitor-computer-object; visitor-computer-context; peer-computer-context) (Sung 2010, 75). This reflects the central tenet of interaction design: Interactive products should support users’ goals and extend the kinds of activities that already take place in their contexts of use (Cooper 2003b; Rogers, Sharp and Preece 2007). To ensure that users’ goals are supported, interactive products should be
Effective, efficient, safe, useful, easy to learn, and memorable (Rogers, Sharp and Preece 2007, 14).

Effective to use

Users should be able to carry out the objectives of the interactive system – the interface should help users to make full use of the system (Rogers, Sharp and Preece 2007, 14). In mobile guidebooks, tours, and multimedia presentations, each of Falk’s five visitor types should be able to find value in the mobile tool and complete their intended tasks. Museum visitors who are seeking information should be able to do so easily, for example, while visitors who are seeking to connect with others should be able to use the tool to connect with others without hassle. The design of the mobile app must make clear to the user its relationship to their activities at the museum.

Efficient to use

Once a user has learned how to use a system, the interface should make it easy for the user to continue using the system to achieve his or her goals (Rogers, Sharp and Preece 2007, 2). Sequences of interaction such as clicking a series of buttons to retrieve information should require as little work as possible on the part of the user by including few steps (Cooper 2003, 91).

Safe to use

Interactive systems should not harm their users, nor should they cause anxiety in users that they will make errors (Rogers, Sharp and Preece 2007, 15). The addition to the interface of back and undo features can help ensure that museum visitors using mobile devices can recover
from any errors they make while using interactive, mobile apps. Museum mobile apps should be set up so that they do not require visitors to perform complex interactions while walking.

*Useful*

The functionality of a mobile app should allow users to do what they need or want to do (Rogers, Sharp and Preece 2007, 16). If the goal of museum visitors is to direct their own learning within a free-choice learning environment, a mobile system must support their ability to learn from museum content. Falk identifies five different visitor types – a museum mobile app should allow all five types to accomplish their visit goals.

*Easy to learn*

People do not like spending time learning a new system and prefer to use a new system right away with little or no direction (Rogers, Sharp and Preece 2007, 16). Mobile museum technologies should therefore be intuitive so that museum visitors can use them immediately.

*Memorable*

Once users have learned how to use a system they should easily be able to remember how to use it (Rogers, Sharp and Preece 2007, 17). Because museum visitors do not visit often (most museum goers visited 2.9 art museums and galleries in 2008, for example), mobile museum technologies should not require users to remember important information about how they work (“2008 Survey of Public Participation in the Arts” 2009, 76).

**Design Conclusions: Content**

Content must not be an afterthought – but it also must not require constant upkeep and creation. Museums vary in their ability to provide content for mobile devices (due to a lack of
content creators or copyrights), and any mobile system to be used by more than one museum should be supportive of this variance. When needed, updating content should be easy. App functionality that supports content should offer:

*>&nbsp;&nbsp;&nbsp;&nbsp;**Support for multimedia**

Multimedia must be supported, especially audio, video, and images. Other types of multimedia such as data visualizations, which have not yet been used in mobile museum apps, could be presented.

>>&nbsp;&nbsp;&nbsp;&nbsp;**Support for third-party media**

Because of copyright concerns in many museums and the difficulty some museums have in making content, any mobile CMS that seeks to help museums create mobile apps should create an engaging experience even when content such as images and video are lacking. Other means of content aggregation such as news feeds from the web and license-free media like Wikipedia content should be explored.

>>&nbsp;&nbsp;&nbsp;&nbsp;*Information layering*

Personal relevance and interpretation is key to modern museum visitors’ experience (Tallon 2008, xiv). Visitors using mobile devices should be able to pursue their own agenda by selecting to view only the information they perceive as valuable. Information should therefore be layered so that visitors who want a general idea of museum contexts can scan mobile content for general information, while museum visitors who want to dig deeper may do so.

*>&nbsp;&nbsp;&nbsp;&nbsp;**Support for diverse approaches - Creating Opportunity Spaces**
There are diverse approaches to presenting content and contexts in museums. Some exhibits feature engaging narratives to share sociocultural information (Falk and Dierking 2000d, 49), while other exhibits lack a variety of interpretive materials and may present visitors with a lot of objects and simple wall texts. Other museums task their visitors with problem-solving to encourage engagement with museum content and contexts. A mobile guide should create an opportunity space for these different types of exhibit presentations, and support a variety of approaches from narrative experiences to visitor problem solving and role playing to simply providing visitors with additional information that is currently lacking in the exhibit itself.

Saving and sharing content

Museums want to extend the visit experience beyond the walls of the museum. Bookmarking and allowing visitors to preview content or to revisit content from the mobile experience is one way to extend the experience and market the museum. A mobile app should allow visitors to save content and to share previews of content on their social media sites.

New Possibilities: News Feeds and Social Participation

In the last section, design implications were based on an investigation into the current state of mobile museum experiences as well as visitor types and museum goals. But it should be noted that by selecting content for museum visitors to see in the museum and on their devices, museum professionals act as gatekeepers in a mass media paradigm where experts select what the masses should see, hear, and read, and the audience chooses among the offerings. Today’s audiences do not always access information from mass media – the very technologies that help museums go mobile also support an Internet where media consumption is a personalized experience of choice and control from an ever-streaming flow of information. Museum
professionals say they support a view on interpretation in which every visitor is “his or her own interpreter” and authority has been somewhat relinquished from the curator to the public (Silverman 2004, 237-9). Mobile tools help visitors to exercise autonomy in the physical context of the museum by helping them to find content of interest to them and to ignore curated content they do not find valuable. Mobile tools also can help visitors contribute to the sociocultural context of the museum by adding their own voice through contributions and discussion. In what other ways can mobile tools break down the gatekeeping function of museums and help visitors to engage in free-choice learning?

Many museums now look toward creating and hosting exhibits that explore contemporary issues, toward incorporating contemporary issues and perspectives into exhibits that deal with the past, and toward keeping visitors updated on research concerning unique artifacts. Acting on warnings 20 years ago by prominent museologists that museums risked becoming irrelevant if they did not adapt to society’s increasing demand for information and new ways of gathering and systematizing it, museums began a trend toward exploring contemporary concerns like modern-day genocide, endangered species populations, and the obesity epidemic (MacDonald and Alsford 1991, 305). The inability of most museums to maintain mobile technology may be especially challenging for this type of exhibit treatment, where information is more fluid.

Some museums have employed Wikipedia – which is continually updated through crowd-sourcing, reflects recent news, and appeals to amateurs and professionals alike – as a source for updated and layered information in the mobile learning environment. Wikipedia can help bring outside perspectives and information into the interpretive environment, helping museums to relinquish some control over the messages they present concerning museum objects.
Is it possible that news feeds, which update continually and appeal to amateurs and professionals, could help museums to populate their mobile apps with different perspectives as well?

Learners already build their knowledge using information gathered from disparate sources, including from their school classrooms, from news media, and from on-the-job experiences (Falk 2005, 273). According to the Contextual Model of Learning, new learning always occurs within the context of this prior knowledge (Falk and Dierking 2000b, 32). When confronted with new information, learners assimilate it into their existing knowledge, either reinforcing or updating their understanding of concepts, called schema (Wicks and Drew 1991, 156). News has the power to affect learners’ schema, and people consuming news on a particular topic are likely to have their schemas reaffirmed or updated by the information they receive from news coverage (Wicks and Drew 1991, 163). News also has the potential to spur discussion with others, which can cause the news consumer to shift his or her thinking from the events mentioned in the news to the issues surrounding the events (Park 1940, 677). Because public opinion often rests on information gleaned from news coverage, news can help readers to form a picture of current public opinion (Park 1940, 677), which may differ from the picture presented by museum content. For Professional/Hobbyist type visitors, news may also appeal to their quest for new and in-depth information about subjects they are already familiar with.

Additionally, feeds are inherently attractive to both amateurs and professionals – people viewing feeds can scan lists of articles and select only the ones that appeal to the level or type of information they are seeking (Lee, Miller and Newnham 2008, 315). Feeds can play an important role in knowledge acquisition by helping the learner to draw connections between various pieces of information (Lee, Miller and Newnham 2008, 316). News feeds may contribute to the mobile learning environment by spurring discussion, providing information for schema updating, giving
insight into public opinion on exhibit concepts, and appealing to different types of learners and their quest for personalization.

Mobile tools that let visitors engage with each other socially help visitors construct and present their own interpretations within the app environment (Gray et al. 2012, 10). Other forms of social participation within mobile apps could also help curate and share visitor voices.
CHAPTER 5

METHODOLOGY

Design Methodology

Because visitors will ultimately assess the value of mobile museum tools, a User Centered Design process has been adopted to create and test an app with news feeds and multimedia features. User Centered Design processes allow users to influence the resulting design by participating in various stages of the process (Abras et al. 2004, 1). Designing with users helps designers test their design solutions against actual use to ensure that the resulting design is suitable for its audiences and their tasks (Abras et al. 2004, 10). Design processes that are not user-centric could lead to ill-thought out designs that do not help users accomplish their goals (Abras et al. 2004, 11).

User Centered Design: An Overview

The term User Centered Design (UCD) refers to any design process applied to the design of computerized systems that involves users and focuses on user goals (Abras et al. 2004, 12). UCD is generally regarded as the standard for producing successful products and services (Niemenen et al 2011, 2449). Three main principles guide UCD: Pervasive focus on users and tasks, empirical measurement using simulations and prototypes, and iterative design (Gould and Lewis 1985, 300).
The first principle of UCD is a constant and early focus on users and tasks, which is completed by identifying potential users and studying how they understand and complete the tasks the interactive system will support (Gould and Lewis 1985, 301-302). Potential users may be primary users of the product being designed, as well as secondary and tertiary users such as managers or content developers who will work with the system or oversee others who use the system (Abras et al. 2004, 4). Thorough investigation of user needs, the tasks they seek to accomplish, and the environments in which they will accomplish them is likely to lead designers to an intimate understanding of users and the type of design solutions that may be useful to them (Abras et al. 2004, 4; Cooper 2003a, 55).

The second principle of UCD is empirical measurement through prototype usability testing (Gould 1985, 302). Usability testing, when applied to prototypes of various fidelities, aims to garner feedback and behavioral observation from users to help designers improve an interactive system (Abras et al. 2004, 6). The third principle of UCD is emphasis on iterative design, in which user feedback is used to create incrementally more usable prototypes, which are also tested until an easy-to-use and task-satisfying solution has been found (Gould 1985, 302).

User Centered Design: Process

A variety of UCD design processes exist, although the majority focus on the three main principles or focus on users and tasks, empirical measurement, and iterative design:

ISO 9241-210 (formerly ISO 13407) Human-Centered Design Process

The International Organization for Standards’ ISO 9241-210 standard serves as an authoritative source of advice for designers of interactive systems (de Souza and Bevan 1990, 435). The standard describes six key principles for effective and user-centered design:
- The design is based on understanding of users, tasks and environments
- Users are involved throughout design and development
- The design is driven and refined by user evaluation
- The process is iterative
- The design addresses the whole user experience
- The design team includes multidisciplinary skills and perspectives

(Travis 2011)

The ISO standard emphasizes on understanding users, the kinds of tasks they will use the system to complete, and the environment in which the system is used (Travis 2011). The ISO standard also suggests that designers specify user and organizational requirements before designing (Usabilitynet.org 2013) and provides guidelines on how the usability of a system can be evaluated throughout the design of a system through usability testing (Travis 2011).

**IBM User-Centered Design Process**

In the early 1980s, IBM changed its design policies from a functionality-based framework to a user-centered framework, rewriting its policies across all departments from Human Factors to Customer Service (Shackel 1986, 475). The User-Centered Design process that grew out of this shift requires that designers focus on a system’s potential users at the very beginning of the process and at every step (IBM 2013). IBM’s UCD process also requires that designers assess competitors, design a total user experience through multidisciplinary teamwork, evaluate designs early and often, and manage continual observation by monitoring and listening to users even after product launch (IBM 2013). The process consists of six steps:

- Market definition - Defining competitors and the target audience and their core needs
- Task analysis - Identifying and understanding users’ goals and tasks
- Competitive evaluation - Determining the strengths and weaknesses of competitor’s systems
- Design and walk-through - Creating alternative designs and soliciting feedback from design walk-throughs with users
- Evaluation and validation - Soliciting user feedback as the design evolves
- Benchmark assessment - Testing against the competition
**Other Design Processes**

There are many other design processes based on the three principles for User-Centered Design, advocating a variety of approaches (Web Accessibility Initiative 2013). Because the basic techniques and principles are the same, different variations are likely to include similar steps as the processes just described, including analysis, design, and evaluation stages (Web Accessibility Initiative 2013).

A UCD process derived from the standards of the ISO 13407 Human-centered design process for interactive systems, the IBM Guide to User Interface Design process, and several other usability groups has been adopted for this project. Shown in Figure 2, the process starts with an analysis/planning and concept stage before moving into a design stage. After evaluation at key steps in the design process, the designer arrives at implementation.
Figure 2: User-Centered Design Process.
Project Process

The process adopted for this project includes four steps with 12 design deliverables:

Analysis and Planning (UCD principle 1: Focus on users)

1. User research (literature review)
2. Task analysis (literature review: learning, information-search, orientation, social interaction)
3. Environment analysis (literature review)
4. Competitive Evaluation (competitor analysis)

Concept (UCD Principle 1: Focus on users)

5. User Scenarios
6. User and organizational requirements

Design (UCD Principle 2: Measure usability empirically)

7. Sketches
8. Design and paper prototypes
9. Usability testing of paper prototypes

Implementation (UCD Principle 2: Design and test iteratively)

10. Wizard of Oz digital prototyping
11. Usability testing of digital prototype

Usability Testing Methodologies

Usability Methods Overview

Usability is not measured directly. It can, however, be assessed through qualities of an interactive system such as how easy the system is to use (Hornbaek 2006, 80). Several methods can be employed to measure qualities of an interactive system, including heuristic evaluation, performance measures, thinking aloud, observation, questionnaires and interviews, focus groups, logging actual use, and user feedback (Nielsen 1993, 224). Nearly all usability testing methods involve giving potential users access to proposed system designs and observing their behavior (Nielsen 2007).
Two usability testing methods are generally used in the study of mobile devices: laboratory experiments and field studies (Zhang and Adipat 2005, 298), both of which are used in this study. In laboratory experiments, an experimenter provides potential users with a system in a laboratory setting, then defines goal-oriented tasks for participants to complete and records participants’ use of the device and their reactions as they complete the tasks (Zhang and Adipat 2005, 298). Although the participants are in an artificial situation, “people engage strongly with the tasks and suspend their disbelief…users allocate their mental resources to what’s happening on the screen, not what’s happening in the room” (Nielsen 2005). In field studies, potential users are given a system to try out in the environment in which the finished system will be used.

In both methodologies, usability tests help designers to collect data concerning the five usability components of learnability, efficiency, memorability, errors, and satisfaction. These components can be qualitatively measured through interviews or quantitatively measured by counting how many tasks users can successfully complete, counting the number of errors users make, quantifying the ability of users to recall information from the interface such as location of buttons, measuring the completeness of users’ solutions to tasks, and expert assessment of a participant’s performance (Hornbaek 2006, 83).

*Lab Experiment: Paper Prototyping*

This study used paper prototyping early in the design process. Usability testing of paper mock-ups is recognized as a viable method for involving users early in UCD processes and uncovering usability problems (Snyder 2001, 1). Paper prototype testing is just as effective as high-fidelity testing at uncovering usability problems in interactive systems (Virzi 1996, 240) because participants are able to suspend their disbelief and treat the system as real (Nielsen 2005).
To create a paper prototype, designers of interactive systems decide what tasks the user should accomplish and then create screenshots or drawings of the interfaces that facilitate those tasks (Snyder 2001, 1). The screenshots or drawings are given to users representative of the target audience, and the users are asked to describe how they would complete the predetermined tasks using the paper prototype or are asked to interact with the paper prototype as if it were fully functional (Snyder 2001, 1).

Participants

Although testing with 10 users will uncover nearly all usability errors in a system, usability expert Jakob Nielsen suggests conducting multiple tests across the lifecycle of a design project with five users in each test, who will uncover 85 percent of usability problems in each round of testing (Nielsen 2000). For this study, five participants were recruited via convenience sampling and asked to provide feedback on paper prototypes and to describe how they would complete several museum-related tasks using the interface.

Qualitative Measures

Behavioral observation and think-out-loud feedback were collected. Participants also were asked open-ended questions about the interface and their likelihood of using it in a museum setting. Users were studied for their ability to complete tasks as well as their subjective satisfaction. Quantitative measures such as the amount of time it took users to complete a task or the number of errors they made were not collected. Collecting usability metrics for quantitative studies requires four times as many participants as simple user testing due to natural variation between users’ ability to learn new software and their quickness in using interfaces (Nielsen 2006). Usability expert Jakob Nielsen suggests implementing quantitative testing only after an
organization has matured in respect to integrating usability into their design lifecycle (Nielsen 2006).

Field Study: Digital Prototype Testing

Sung presents an HCCI Model describing how mobile technologies allow museum visitors to interact with various aspects of the museum experience, namely a museum’s objects, contexts, visitors, and the mobile technology itself (Sung 2010). This study used a field study to test a digital prototype created in App-Press software.

Participants

Five users were recruited via convenience sampling to test a high-fidelity prototype at a small cultural center in Muncie, Ind.

Qualitative Measures

Behavioral observation and think-out-loud feedback were collected. Users were studied for their ability to complete tasks. Qualitative data also was collected from a paper survey that participants were asked to fill out after completing the task portion of the study, which included several open-ended questions concerning user satisfaction.

Quantitative Measures

Although collecting quantitative metrics, such as the time it takes users to complete tasks with an interface, is not recommended early in the design process (Nielsen 2006), quantitative data was collected via a survey instrument to measure participants’ subjective satisfaction levels. Questions were adapted from John Brooke’s SUS survey instrument and a questionnaire developed by Website Analysis and Measurement Inventory (WAMMI).
CHAPTER 6

BODY OF THE PROJECT

Because visitors will ultimately assess the value of mobile museum tools, a User Centered Design process was adopted for this project. The process consisted of research, conceptualization, and design stages, which are summarized in this chapter.

Research

User Research

Chapter 2 identified and described museum audiences, and museum professionals’ attitudes toward mobile tools. Mind maps shown in figures 3 and 4 were created to organize and present data describing both museum visitors and the attitudes of museum professionals at museums that currently have or plan to create mobile technologies.
Figure 3: Mind Map of Museum Visitor Research
The text of the mind map is reproduced below:

**Museum Visitors Using Mobile**

Prefer short videos, images to text in Multimedia presentations (Proctor and Tellis 2004; Bellotti et al 2002; Sung 2010; Procida and Mausser 2012)

Problem-solving can focus attention and promote learning (Sung 2010).

Will read bookmarked content later (Semper and Spasojevic 2002; Fleck et al 2002; Bellotti et al 2002).

Are more prone to seek out in-depth information after their visit (Bellotti 2002, 40).

Report feelings of isolation (Sung 2010; Hsi 2002; Bellotti et al 2002; Sung 2010)

Majority responding publicly to discussion questions will respond on-tas; this can increase visitor impressions, participation and enthusiasm (Charitonos 2012, 817)

**Core Visitors' Interpretation Preferences (Bubp 2010)**

Overall

Majority experience is exploring on their own, with little or no staff facilitation.

Fewer than half of visitors want their experience to primarily be viewing objects

Art museums

72 percent prefer to explore museum on their own

History museums

Want to explore on their own but have staff available to interact with (but not to guide them)

Children's Museums

Visitors want to guide themselves and engage with a lot of hands-on activities

**Visitor Demographics (Reach Advisers 2010)**

Art museums

Older visitor base

65 percent over age 50

86 percent have college degree

Less diverse than museums overall

Science Centers

Younger visitor base

72 percent under age 50

2/3 are parents of minor children

Most diverse audience

Want to see more changing exhibits

History museums

Older visitor base

65 percent over age 50

78 percent have college degree

Least diverse audience

Low demand for new exhibits

Children's Museums

89 percent under age 50

Mostly female (89 percent)

Mostly parents of minor children (88 percent)

2/3 have an infant, toddler or preschooler
81 percent have college degree
Highest income - 44 percent income over $100,000
More diverse than art and history museum audiences
Are less likely to say that the museum meets their needs
Make the most visits
Adults in their 20s
  More likely to report that museums are "fun"

**Behavior Patterns (Falk and Dierking 2010, 56-63)**

Visitors spend more time in the first few halls they visit and less in halls they visit later
First-Time and Occasional Visitors go through orientation, intensive looking, exhibit cruising and leave-taking. Most spend the first few minutes in the museum determining what there is to see and where to go.
Frequent visitors spend one to two hours in the museum,
Organized groups (field trips, for example) are lead by museum staff.

**Five Visitor Types (Falk 2010)**

- **Explorer**
  - Curiosity-driven
  - Me-centered agenda
  - Likely to meander
- **Experience Seeker**
  - Wants to see iconic exhibits
  - Wants to make memories
- **Facilitator**
  - Visits in a group
  - Focused on what companions want to do
  - Does not direct the visit but tries to help others in the visit group achieve their goals
- **Professional/Hobbyist**
  - Adept navigators
  - Rely on prior knowledge
  - Wants to study artifacts
  - Enter museum with specific, content-oriented goals
- **Recharger**
  - Seeks restorative experience
  - Wants a peaceful or inspiring experience
  - Less interested in museum content

**Level of Engagement (Reach Advisers 2008)**

- **General Public (largest group)**
  - Not really interested
- **Casual Visitors**
  - Do not seek out museums but may go to one every now and then
- **Core Visitors**
  - Members and supporters
  - Visit local museums
  - Do not form emotional connection with museum
- **Advocate Visitors (smallest group)**
  - Have a long-term connection and commitment to museum
Visitors with kids (Reach Advisers 2010)
Parents visit for extrinsic reasons: ex.) enrichment of children
Adults without children visit for intrinsic reasons: ex.) Curiosity and interest in subject matter

Age 16-25 (AAM 2010)
Want museums that are interactive, immersive and participatory
Want choice of activities and exhibits
Want personal relevance
Want social activities at the museum

Archetypes: Movement through museums (Casey 2004)
Browser
   Unordered path of travel
   Content is secondary
Greatest Hits Seeker
   Wants to see "the best" works
   Wants to see anything famous
Aficionado
   Knows where to go
   Has a broad and critical approach
Tourist
   Feels compelled to "do" the museum
Analyst
   Informed by a specialty
   Student or professional in the field
   Takes a deep dive, analytical approach
Socialite
   Enjoys social aspects
   Takes dates, friends, family

Capturing Attention (Bitgood 2011)
1. Capture stage
   Orienting: Drawn to loud noises, large objects, etc.
   Searching: Visitor systematically looks around space for something of interest
   What captures attention
   Objects with perceived value
   Distinctive objects
   Close objects
   Objects organized in sequential manner
   Powerfully distracting objects
2. Focus Stage
   Attention is briefly narrowed
   What visitors focus on
   Organized objects
   Objects with perceived value
   Distracting objects
   Objects isolated from others
   Objects with high contrast against background (this is why lights are often pointed at
objects)
Focusing devices such as spot lights or signs that ask visitors questions about objects

3. Engage stage
Visitors engage with exhibit content and perform perceptual, cognitive or affective (emotional) processing

What visitors engage with
- Objects with perceived value
- Objects with appealing message characteristics - either high readability or emotional quality
- Familiarity with experience (if it reminds them of prior experience)
- Physical and mental states: If the visitor is not fatigued, or if they are a Recharger type

Figure 4: Mind Map of research into the museum mobile market

The text of the mind map is reproduced below:

Museums Going Mobile
Creation of Content/App (Museums and Mobile 2013)
In-house
  Project planning
  Content: Script development
  Marketing
  Content management
  Distribution and management
Out-sourced
  Interaction/wireframe design
  Technical/software development
  Publishing to app store
  Technical support
Little bit of both
  Graphic design
  Publishing to devices

Paid Vs. Free
70 percent of mobile apps are free to visitors (Museums and Mobile 2012).

Demographics
Art museums/galleries are more likely to already be offering mobile. Only 20 percent do not have mobile or have no plans for mobile (Museums and Mobile Survey 2012). The larger the museum attendance, the more likely mobile is already used (Museums and Mobile Survey 2012). More museums with attendance from 50,001 to 250,000 annually have mobile or plan to get mobile (probably because there are more of that size) (Museums and Mobile Survey 2012). 1/20 museums had smartphone apps in 2011 (American Alliance of Museums 2011)

Concerns
  Copyright
  Accessibility
  Want multiplatform apps (Museums and Mobile 2013)

Who is involved in mobile app creation?
  Multiple departments (Education, Marketing, IT) (American Alliance of Museums 2011)

Perceived Challenges 2011 (American Alliance of Museums 2011)
  Funding
  Knowledge
  Internal resources

Perceived Challenges 2013 (Museums and Mobile 2013)
  Resources required to sustain the mobile experience
  Resources required to implement the mobile experiences
  Keeping the experience up-to-date

Objectives 2011 (New Media Consortium 2011 Horizon Report)
  Provide supplemental information about an exhibit or museum itself
  Mobile guide through collection or gallery space

Objectives 2012 (Museums and Mobile Survey 2012)
  Provide additional interpretation
  Create a more interactive Experience
  Raise the profile of the institution
Objectives 2013 (Museums and Mobile 2013)
   Experiment with visitor engagement
   To attract new visitors to the museum
   Raise the profile of the institution

Perceived Challenges 2012 (Museums and Mobile Survey 2012)
   1. Insufficient staff time to operate and maintain experience (keeping the mobile app up to date)
   2. Other
   3. Not a priority (21 percent)
      Too expensive (12 percent)

Who they think their audience is (Museums and Mobile 2013)
   Young adults 18-35

Task Analysis

   A review of the literature in Chapter 3 identified free-choice learning, information-search, orientation, and social interaction as key tasks visitors are likely to engage in in museums. The research is summarized in the following table:
<table>
<thead>
<tr>
<th>IN-MUSEUM TASKS</th>
<th>PURPOSE</th>
<th>IN-APP TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Viewing objects seen as interesting</td>
<td><strong>Personalization and Control</strong></td>
<td>• Control over what is seen by selecting only desired content</td>
</tr>
<tr>
<td>• Managing attention between interpretive devices</td>
<td>Visitors’ learning is based on prior knowledge, experiences, and interests, which guide their visit motivations and expectations (Falk and Storksdiek 2005, 747).</td>
<td></td>
</tr>
<tr>
<td>• Participating or not participating in tours, interactives, etc.</td>
<td><strong>Orientation</strong></td>
<td>• Control over the level at which content is presented through information layering</td>
</tr>
<tr>
<td>• Viewing maps</td>
<td>Visitors orient to the physical space prior to and during their visit. Orientation is done through exposure to exhibits and programs, reinforcing of events, and experiences outside the museum (Falk and Storksdiek 2005, 747).</td>
<td></td>
</tr>
<tr>
<td>• Following signage</td>
<td><strong>Social interaction</strong></td>
<td>• More in-depth search after museum visit based on links from mobile tool</td>
</tr>
<tr>
<td>• Visiting museum website before the visit</td>
<td>Learning is both an individual and group experience: Learners make sense of the world through social interaction. In the Contextual Model of Learning: Sociocultural knowledge through group social mediation</td>
<td></td>
</tr>
<tr>
<td>• Visiting the museum website after the visit</td>
<td></td>
<td>• Suggestions for related content</td>
</tr>
<tr>
<td>• Attention-focusing signage/devices</td>
<td></td>
<td>• Non-linear access to content</td>
</tr>
<tr>
<td>• Talking to visit group</td>
<td></td>
<td>• Content sorting/filtering</td>
</tr>
<tr>
<td>• Talking to museum staff, docents, tour guides, etc.</td>
<td></td>
<td>• In-depth search through Wikipedia or news feeds</td>
</tr>
<tr>
<td>• Recalling visit experience to others</td>
<td></td>
<td>• Maps w/current location</td>
</tr>
<tr>
<td>• Leaving comment cards/writing in exhibit comment books</td>
<td></td>
<td>• Prompts from mobile tools to guide attention/promote investigation into an object or exhibit</td>
</tr>
<tr>
<td>• Responding in app to discussion questions</td>
<td></td>
<td>• Using current location to personalize experience</td>
</tr>
<tr>
<td>• Experience documenting</td>
<td></td>
<td>• Bookmarking ahead of time creates personalized tour</td>
</tr>
<tr>
<td>• Social sharing with social media</td>
<td></td>
<td>• Bookmarking for further study</td>
</tr>
<tr>
<td>• Questions that prompt discussion w/visit group</td>
<td></td>
<td>• In-app recommendations</td>
</tr>
</tbody>
</table>
Environment Analysis

Chapter 2 presented Sung’s HCCI model, which describes how visitor interact with museum environments, which includes mobile devices, objects, object contexts, and other visitors. The HCCI model is repeated here:

![Diagram of HCCI model](image)

Figure 5. The Human-Computer-Context Interaction Framework (Sung 2010)

Competitor Analysis

Chapter 2 described methods museums employ to create and maintain mobile tools. Competitors strengths and weaknesses are summarized in the following chart:
<table>
<thead>
<tr>
<th>COMPETITOR</th>
<th>PERSONALIZATION</th>
<th>ORIENTATION</th>
<th>SOCIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>TourSphere</td>
<td>• Access tour content out of order</td>
<td>• Floor Maps with clickable pins for specific sites</td>
<td>• Polls</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Keypad for entering exhibit numbers to deliver content</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Audio prompts to focus attention on exhibit content</td>
<td></td>
</tr>
<tr>
<td>TourML</td>
<td>• Access tour content out of order</td>
<td>• Tours can be placed in same order as they are experienced in museum</td>
<td>• Social sharing not standard, could be</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Keypad for entering exhibit numbers</td>
<td>added with code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Audio prompts to focus attention on exhibit content</td>
<td>• Polls</td>
</tr>
<tr>
<td>Smartour</td>
<td>• Access content out of order</td>
<td>• Map with clickable pins for specific sites</td>
<td>• Social sharing</td>
</tr>
<tr>
<td></td>
<td>• Search for content</td>
<td>• Keypad for entering exhibit numbers</td>
<td>• Share photos with museum</td>
</tr>
<tr>
<td></td>
<td>• Sort by categories</td>
<td>• Audio prompts to focus attention on exhibit content</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Bookmarks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conceptualization

User Scenarios

Research conducted in the Analysis and Planning stage informed the creation of the following user scenarios:

Scenario 1
Sarah (experience-seeker) is in town for the weekend visiting a friend from college. Neither Sarah nor her friend have never been to the local museum but want to visit while Sarah is in town. Sarah knows that the museum has some famous sculptures, which she wants to see before she heads back home. When she gets to the museum, she buys tickets and uses the museum’s app to see where the sculptures she heard about are and how she can get to them.

Sarah’s friend (facilitator) has never been too interested in the local museum’s collection, but wants to make sure Sarah has a good time while she is in town. Sarah and her friend find the exhibit where the sculptures are and Sarah takes pictures of the sculptures and of herself and her friend in front of them. She posts the photos to Instagram. Sarah and her friend wander around in the exhibit after seeing the sculptures, then they consult the museum app to see if any other well-known artifacts are featured in the museum’s other exhibits. They use the map in the app to figure out where they can see the other famous works. After they have seen all of the well-known items, Sarah and her friend breeze through a nearby exhibit, consulting the “See Nearby” section of the app to see if there is anything worth stopping at as they go. They consult the app to see if the gift shop is still open, visit the gift shop and then leave.

Scenario 2
Mary (facilitator) has decided to bring her husband and their five-year-old daughter to the museum during Spring Break. Mary checks the museum’s app couple of days ahead of time to see if the museum has information on any special exhibits or events her daughter might enjoy on the day they are visiting. She sees that on the day they are visiting, the museum is having an event about Hot Wheels cars and will have a real race car kids can touch and sit in. She bookmarks the event in the app. She also sees an exhibit on her daughter’s favorite subject – dinosaurs – and bookmarks the dinosaur exhibit.

When Mary and her family arrive, Mary already knows what exhibits she thinks her daughter will enjoy and learn from. She opens the bookmarks on her app and asks her daughter if she wants to see the Hot Wheels cars or dinosaurs. As they go through the exhibits, Mary points out interactive installations her daughter can play with. When her daughter has a question about something at the museum and Mary does not know the answer, she consults the app’s Wikipedia pages and links to see if she can find an answer. Mary notices that some of the pages in the app have quizzes, and helps her daughter select answers in the quizzes then sees if they got the answer right.

**Scenario 3**

Coulter (recharger) has had a long week at work, and decides to visit his favorite art museum in town during his free time on Saturday. He uses the museum’s app to check their hours and then tries to think of a time during those hours when the museum might not be very busy. When Coulter arrives at the museum, he visits his favorite exhibit and takes a seat at a bench across from one of his favorite works or art. After a while he opens the museum app just to see what’s in it, and notices that he can sort museum content by category. He selects the
category filter button and sees exhibits labeled as “contemplative.” He looks at the list of exhibits and decides to wander to one and have a seat there.

Scenario 4

Joseph (professional/hobbyist) has always wanted to visit a museum he has read about online, which has a collection of rare gems. Joseph considers himself a sort of amateur gemologist, and likes to post advice about gems in online forums devoted to the subject. He has heard that the museum he is about to visit has one of the best collections of gems in North America. Joseph visits the museum’s website before his trip, and seeing that the museum has a mobile app, downloads it. Joseph uses the website to read all the information he’ll need for his trip, such as the museum’s hours and ticket prices. He uses the app to look at what exhibits the museum has and seeing a gem exhibit that interests him, takes a look at the museum’s collection. When Joseph arrives at the museum, he heads straight for the gem exhibit and tries to look at everything in every room of the exhibit. When a gem is particularly interesting, he uses the app to read more about it. When he comes across information he did not know before, he pays special attention to it. When Joseph encounters gems he already knows a lot about, he checks the news section of the object’s app page to see if there’s anything new to know. Joseph notices that he can comment on some of the gems displayed in the exhibit and shares his extensive gem knowledge with other visitors. Since he knows so much about gems, he recommends the gems in the collection that he thinks are especially rare or interesting.

Scenario 5

The local museum is having a free admission day, and Rebecca (Explorer) thinks this is a great chance to check out the museum, which she’s always thought would be fun. She recruits
her friend Evan (Experience Seeker) to go with her. When they arrive at the museum, signage explains that the museum has an app. Rebecca is curious about the app and downloads it to see what it’s all about. Rebecca sees a photo in the app of a stuffed polar bear, which they can also see from where they are standing in the lobby. Rebecca convinces Evan to start in that exhibit. She wanders through the exhibit and when she sees something she’s curious about, she uses the app to learn more. She really likes the videos in the app, which explain what she’s looking at and tell her about all the details of each artifact. She recommends the objects with the best videos. Evan asks Rebecca if he can use her phone to look in the app, and sees that there’s a list in the app of all the famous objects at the museum. He consults the list and bookmarks what he hopes to see before the two leave the museum later. As they travel through the exhibits, Evan takes the bookmarks off of the famous objects they see, so he always knows what’s left to see. Rebecca and Evan both start to get kind of tired of being at the museum, so they agree to use Evan’s bookmarks in the app as a sort of “to-do list” of what they need to see before they leave, then visit most of those objects, ignoring the other objects in each exhibit.

Scenario 6
Laura (professional/hobbyist), who is in town visiting Jared and his roommate Emily (facilitators) visit Laura’s favorite exhibit at one of her favorite museums. Laura is eager to show Jared and Emily all of her favorite parts of the exhibit. As she walks her friends through the exhibit, she tells them all about each of her favorite objects. At each of her favorite objects, Laura uses the app to pull up Wikipedia pages on each object, showing them on her screen to Jared and Emily to reinforce that what she’s said about her favorite objects is correct. She scans the news section of her favorite objects’ pages to learn more about them. When Jared or Emily have questions about objects in the exhibit she does not know that much about, Laura consults
the app and reads pertinent information to them to answer their questions. If she cannot answer their questions, she bookmarks the object in the app so she can look it up and have an answer later when they are driving back to Jared and Emily’s apartment. Because Laura knows she has excellent taste in things to see in this particular exhibit, she uses the app to recommend her favorite parts.

**User and Organizational Requirements**

Research conducted in the analysis and planning stage informed the creation of the following requirements lists:

*Visitor Requirements (Primary Audience)*

- Choice and individualized learning options - non-linear access to content
- Mobility and connectivity, including social
- Engagement, not distraction
- Flow experiences for a variety of audience abilities
- Accessible before, during and after visit
- Perceived value for all five visitor types
- Mobile experiences trigger museum experiences
- Personalized options
- Orientation to museum through map, location awareness
- Easy to use, follows usability standards

*Museum staff requirements (Secondary Audience)*

- Should be flexible enough to create an experience regardless of how much content museum staff can create specifically for the app
- Content management and updating can be done easily by museum staff
- Promotional/marketing ability
- Tech work kept to a minimum
- Social should be moderated or have some kind of accountability
- Meets accessibility standards (content available in multiple formats)
- Flexible enough to be used for a variety of presentation types (narrative, problem-solving, multimedia tour)

**Design**
Sketches

Sketching was used to explore design alternatives:

Figure 6. Sketches showing app pages with a quiz and a ranking system for content.
Figure 7. Sketches showing photo-centric design and information architecture.
Figure 8. Sketches showing a bookmark system and news feed with discussion questions.

Design and Paper Prototypes
Digital wireframes and an information architecture were created:

Figure 9. Information Architecture. The Ad Slider, Exhibits, Events, Bookmarks, and About sections are all accessible from the home page and from a navigation bar across the bottom of the screen. At the object level, a variety of content types (Twitter, data, news, etc.) are available for each item. This creates an Opportunity Space in which different museums can select different types of content for their objects.
Splash Page when app starts

Home page with ad slider across the top

About Page
5/20/13 STEPHEN MARC: PASSAGES ON THE UNDERGROUND RAILROAD

April 27-September 2

For nearly a decade, photographer Stephen Marc has traveled to Underground Railroad sites in more than 20 states and Canada, documenting the places and people associated with this network of secret routes and safe houses used by enslaved African Americans seeking freedom. Join us at the National Underground Railroad Freedom Center for the special exhibition, Stephen Marc: Passage on the Underground Railroad, which utilizes dramatic landscapes of the Underground Railroad to create powerful stories that bring the past into the present.

$10 for adults, $5 for seniors and students. Free for members. Click here for more information about the exhibition.

Exhibition Sponsors:

Sponsored by F&G and the US Department of Education

Stephen Marc: Passage on the Underground Railroad was organized by the University at Buffalo Art Galleries, Buffalo, New York. The exhibition was curated by Sandra H. Olsen, Director, UAB Art Galleries. The publication Stephen Marc: Passage on the Underground Railroad was organized by the University at Buffalo Art Galleries, Buffalo, New York. The exhibition was curated by Sandra H. Olsen, Director, UAB Art Galleries. The publication

Single Event Page, showing event information.

Exhibit Listing, showing all exhibits at the museum. Buttons for filtering by popular, location, and category are shown.
Exhibit Listing, showing exhibits listed by category.

The list of objects in a single exhibit. Objects are sortable by popular, location, and category.

The page for a single object, showing a photo slideshow and links to other content pages.

The page for a single object, showing a video and links to other content pages.
Discussion page, on which users can Tweet answers to pre-written questions.

Poll page, in which users respond to provided poll questions.

A page showing the results of the poll.

Keeping up the fight against child sex trafficking
The White House Blog - 7 hours ago

Review: ‘Cuato Corridos’ is a disturbing look at sex trafficking
Los Angeles Times - 8 hours ago

Kadin urges gov't to act on forced labor after number of slave cases rises
Jakarta Globe - May 6, 2013

$240 M award to disabled men held in forced labor
Newsday - May 2, 2013
Infographics page, showing how infographics can be used in the app environment.

Bookmarks page, where users can see a list of the items they’ve bookmarked.

Figure 10: Wireframes for Paper Prototyping
Paper Prototype Testing

The digital wireframe was printed and tested in usability sessions with five participants in a lab setting. All five participants own smartphones, although one participant said he had only downloaded three apps to his smartphone and was not very interested in using most of the phone’s features.

Users were presented with each page and asked to describe what they saw, and what they thought would happen when they clicked the icons and buttons on each page. Users also were presented with small tasks such as contributing to the discussion for exhibit objects and participating in the polls. Users also were shown a photo of an object in the museum and asked what they would do if they saw the object while wandering the museum and wanted to find more information about it.

All users were able to use the homepage to navigate to the exhibits, events, bookmarks, and about pages, and all users correctly identified the slider on the homepage as ads or photos they could flip through. All users knew what the share buttons and bookmark buttons were and correctly guessed that the map would be located in the About section. All users also were able to navigate from the homepage to the exhibit object page and its associated content. Four of the five participants, when presented with the object page, selected the video first, indicating that visitors are interested in video content as suggested by previous research into mobile museum tools.

All five users struggled with the Main Menu button, thinking it would take them to the homepage when it in fact presented a drop-down. This suggests that the button should be renamed or altered. Four of the five users did not know what the International Labor Union option was on the object page (it was a link to the ILP website), suggesting that links should
include the word “link” or an icon hinting that the button is a hyperlink. Three of the five users did not understand what the popular button was or how the popular ranking system worked, suggesting a redesign of the app’s rating system. Two users pointed out that the bookmark button was already filled in, so it looked like everything had already been bookmarked. One user suggested making the bookmark button hollow and then having it fill in when an object is bookmarked.

When they were shown a photo of an object at the museum and asked how they might learn more about it, participants gave the following answers:

- One would search in the app.
- One would ask a man in the photo who was wearing a nametag and appeared to work for the museum, and then search in the app if they still wanted to know more.
- One would look for a plaque near the object.
- One would ask the man in the photo or look for a plaque and then use the name of the object provided by either of those to find the object in the app.
- One would search in the app first, then would talk to the man in the photo if the object was not in the app.

This suggests that some users will consult the museum material first before looking to the app. Although most users said they would eventually look in the app, most were not sure of the best way to find the object, with only two users saying they would find the list of exhibits, select the exhibit they were currently in, and then look for a photo of the object. This suggests a need for better orientation to the museum environment such as geolocation or the use of a numbering system like the system used by competitors.

### Implementation

**Wizard of Oz Prototyping**

A digital prototype was created using App Press, an online web application for designing and publishing mobile apps for iOS and Android devices. Although App Press is a robust system
for multimedia apps, it does not allow for databases. Some features such as the recommendation system bookmarking system and location awareness were shown visually in the prototype but were not fully functioning.

The initial, welcome page of the app

The events page showing event listings
An example of an event page

The bookmark page, showing bookmarked items, sortable by popular, closest and category
The info page of the app, with scrolling text

The map page of the app
The list of exhibits, showing a bookmarked and recommended exhibit.

The list of objects in the Wicked Bugs exhibit.
An object page, showing a photo slider

An object page, showing a video with transcript
Each object can feature one of many content choices, including discussions boards, polls, infographics, links to Wikipedia, and links to the web. This is an example of news content.

Video transcript
An example of an object-related infographic

An example of the discussion board. In this example, the board is used for sharing stories.
An example of an object-related poll

Poll takers see a breakdown of results
An example of a poll, used here as a quiz

The answer to the poll presented as a quiz
An example of Wikipedia content

An example of an outside link used in the app
Each secondary content area (Wikipedia, poll, discussion, etc.) page features a drop down menu for that object.

Figure 11: Screenshots of rapid prototype
Usability Testing: Conceptual Concerns

The digital prototype was tested in a field experiment in Wicked Bugs, a travelling exhibit about pest bugs and their effect on history and society based on the book Wicked Bugs by Amy Stewart. The exhibit is currently located at a small cultural center in Muncie, Ind. Five participants were asked to complete museum-related tasks such as finding an exhibit, using the mobile app to learn more about the bugs in the exhibit, and contributing stories and poll/quiz answers to the mobile app. They also took a short usability survey to provide feedback on the app design and were given time to explore the exhibit using the app (or not using it, if they preferred) without guidance. Subjects were scheduled to complete the test individually, but the last tester arrived with her boyfriend, who was allowed to use the app and tour the museum with her but was not surveyed.

While usability testers largely reported that the system was easy to use, the results of the field experiment underscored the need to explicitly connect app content to museum content. Although prior research suggested that mobile experiences ought to trigger museum experiences, field tests showed that museum experiences also should trigger experiences within the app. The design of the exhibit signage and mobile app must make their relationship to each other clear to the user.

All of the testers relied heavily on the physical design of the exhibit space to guide their visit, and four began their exploration of the exhibit space with a display on butterflies that was placed immediately in front of the entryway. This supports museum researcher Stephen Bitgood’s assessment of visitor attention – visitors are heavily influenced by the layout of content within exhibits and displays that are placed directly in the visitor’s path will receive
immediate attention (Bitgood 2010). Despite having an app in front of them with information on what was in the exhibit, visitors still followed the physical layout of the exhibit.

All of the testers showed a preference for video content. Without prompting, when allowed to explore the app freely, four of the testers watched videos when they were provided in the app. Testers also used the photos attached to each exhibit in the exhibits listing page to judge the content of the exhibit, with two testers saying they would want to explore the Rose Garden exhibit because of the pretty flower photo included with it and one tester saying he would explore the Bugs: Outside the Box exhibit because the photo for it in the listing showed a “cool-looking” bug. All but one of the testers were ambivalent about the bookmarking feature, with most reporting that they would not really want to bookmark anything and if they did, they probably would not look at it later.

The five testers displayed different museum exploration habits. Two preferred to skip around in the exhibit, scanning the room and looking only at what drew their attention, while three preferred to start at what they perceived as the beginning of the exhibit and move in sequential order across the exhibit space, glancing at nearly everything but only stopping to look further at anything that interested them.

One tester was particularly interested in storytelling, and related to much of what she saw in the app and in the museum by telling stories about exhibit items (in this case, common insects) to the researcher. She was interested in using the app to share her story, but did not always know which exhibit items solicited stories and which did not. Signage included with museum objects could mediate this confusion and entice storyteller-type visitors to contribute. She also said she enjoyed the storytelling aspect of audio wands used in some museums but hated how they droned on and often did not let her skip around. She liked that the test app gave her lots of options to
learn more on her terms. This tester was also the oldest at 60 years old. Although she owned a smartphone, she reported using the least amount of apps. She tended to explore the museum and the app in order, by visiting each object along the path and following along in the app sequentially. She also expressed a preference for watching the “How to use this app” video before using the app and was the only tester to express concerns that Wikipedia content may not be accurate. She ranked Wikipedia content and the bookmarking system (which she indicated she would not use) as the least attractive features of the app. She ranked the exhibits listing and the infographics as her favorite.

Another tester was a very casual museumgoer – possibly an Experience Seeker type – who preferred to wander through the exhibit and glance at everything. He seldom stopped to examine any content thoroughly and used the app sparingly in the exhibit. In the usability survey, he rated the Wikipedia content and the quizzes as his favorite, while he indicated that the events page was too confusing and that he did not think the news content, which he did not look at, had anything to add to his knowledge. He also expressed disappointment that the museum exhibit did not have particularly well-known or interesting content, and during the post-visit interview said he might be more likely to use the app at a museum with more well-known or exciting artifacts. He was the only tester to report that he app did not help him find things at the museum of interest to him.

Another tester, who travelled the exhibit in a sequential order based on its physical design, ranked news and events as the best features of the app, writing in the post-visit survey that, “the news helps make a timely and significant connection.” The tester, when given time to use the app in the exhibit freely, was pleased to see a news feed provided for the mosquito section of the exhibit because she had heard something on the local TV news station about
mosquito populations being a threat this year but had not seen the entire broadcast. She used the app to look through headlines to learn more, but did not read any full articles. The tester did not like the bookmarking feature of the app because she felt that it was so easy to find information in the app she would not want or need to bookmark any of it. She also did not like the recommendation engine in the app because she usually does not rely on app recommendations, which she does not think are usually helpful to her.

The fourth tester ranked Wikipedia content and the “similar objects lists” as the best features of the app and the About section and infographics (which he did not look at during free exploration) as the features he liked the least. When entering the exhibit, he oriented immediately to the display right inside the exhibit by the entrance; then he skipped some explanatory wall panels before giving his attention to the first bug in the Wicked Bugs exhibit. He then followed the exhibit sequentially but only used the app when an object in the exhibit caught his attention.

The final tester was the only subject who did not normally visit museums and the only tester to visit the museum with a partner rather than by herself. One tester held the app and generally decided where to go, while her partner played a more passive supporting role by pointing out museum content he thought the she would like and by discussing answers to in-app quizzes and discussion questions with the tester. Interestingly, app content did spur and lead conversation between the two visitors – they were especially determined to get the Centipede quiz correct and wanted to find more quiz questions to answer together in the app. The tester reported that she enjoyed the Events page and Wikipedia content the best, but said she also enjoyed the polls and quizzes, which made the visit “more interactive.” She indicated that she would not use the Nearby lists because she could already see most of what was listed and that
she was not interested in the infographics. She travelled the exhibit sequentially and looked at app content when an object interested her, which was about one in four objects.

**Usability Testing: Usability Concerns**

Although field testers largely reported that the app was easy to use – calling it “intuitive,” and “straightforward” – field testing uncovered several usability issues. Two of the five testers did not know how to use the bookmarking features and the third knew how but did not like that he could not bookmark everything in the app the same way. Two testers did not recognize the share icon as a social media share button. One tester did not know whether the events in the events list were ongoing or whether the date next to each item was the day it started or the only day the event occurred, and another tester suggested a preference for seeing the events as a calendar so she knew what day of the week each event was on. Finally, only one tester scrolled through the scrollable photos on the homepage and on some object pages.

**Suggestions for Future Iterations**

Field tests provided valuable feedback concerning conceptual and usability limitations of the designed system. Testing informed several future changes to the concept:

- Re-envision the bookmarking system to be less prominent or delete altogether
- Some testers used the app content sequentially with next/previous buttons but some did not, a behavior predicted by Bitgood’s Visitor Attention-Value Model (Bitgood 2010). Most testers did not look at everything in the app, suggesting that museum visitors are not interested in learning more about much of what they see at the museum. To help visitors who do not look at most objects in the museum, add QR or location-based functionality so that visitors can learn more about just the few objects they are interested in without having to search intently through the app.
- Museum signage and experiences should trigger in-app experiences. If a quiz is available, for example, the object sign should indicate that users can test their knowledge. If an exhibit item has news surrounding it, the item’s sign should indicate that visitors can stay up-to-date on the news via the app. For example, in
the Wicked Bugs exhibit, the mosquitos portion of the exhibit could have a sign asking, “Mosquitos are known to carry West Nile virus. Is West Nile still a threat?” with a QR code or an associated number that takes visitors to the appropriate news feed about West Nile in the app.

● The menu button should be taken out. Most users were not interested in seeing all of the content for each item in the exhibit and therefore did not use the menu to skip around in the content areas.

Testing also informed several design changes to the app:

● Users should be able to bookmark from any content page. Each page should therefore carry the bookmark button in an out-of-the-way area such as a corner where the menu is (the menu should be taken out).

● The menu button is not needed and should be replaced with a keypad or QR code scanner and a bookmark icon.

● The events page should show a calendar instead of a list.

● Each exhibit page lists what objects are in the exhibit. It also should include textual directions to the exhibit.

● The share icon should be replaced with a button labelled “SHARE.”

● The photo scroll feature should feature a more prominent arrow or numbering system to make more clear the fact that the photos can be changed.
CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

This project explored the addition of news to the multimedia environment of museum mobile apps. After a thorough investigation into what is known about mobile museum apps, the mobile museum market, and museum visitors, a museum mobile app was created using an iterative, user centered design process.

The app features traditional video, audio, image, and text content as well as Wikipedia, news feeds, and Twitter feeds. The app was field tested in a museum environment with five users. Field tests supported research showing that visitors view museum exhibits with a variety of motivations. One participant, for example, scanned the majority of the exhibit out of order, skipping a lot of objects and spending only a few seconds on each object he did look at without using the app for most objects. Another participant, however, methodically travelled the exhibit, looking at each object in order and following along in the app with the previous and next buttons. The remaining testers used a middle-of-the-road approach, spending just a few seconds on most objects but using the app to learn more about a handful of objects that interested them.

News feeds did not fare particularly well in the mobile app environment, with most visitors skipping over news content during free exploration of the exhibit and one visitor identifying the news feeds as one of the worst features of the app. One visitor also identified the news feeds as one of the best features and looked through them on the app during free exploration. This ambivalence, however, was not special to the news feeds. Wikipedia and video
content were the most popular features. All testers used Wikipedia at some point during their free exploration of the exhibit, and four out of the five watched the videos included in the app. All other content, including discussion boards, polls, infographics, bookmarking, and recommendations received mixed reviews from users and were only used by some participants. When testers were asked what they thought the two best features of the mobile app were, three testers agreed that Wikipedia content was one of the best features and two agreed that the Events listing was one of the best. All other responses were varied, with news, exhibit listings, lists of similar objects, events, and discussion forums all receiving mention as one of the best features. Participants in the field test were asked what the two least enjoyable features were: Infographics and the bookmarking system were the only features that received two mentions each as the worst. The About and Events sections, bookmarking system, recommendation system, nearby objects list, and Wikipedia content each received one mention as the worst.

The survey sample was too small to draw generalize-able conclusions from what visitors reported, but behavioral observation of participants showed that visitors were in fact varied in their attraction to different content, with some visitors favoring some types of content over others. When given free time to explore the exhibit, the tester who spent the least amount of time in the exhibit, tended to scan the exhibit content, and wandered from object to object only used the app to read Wikipedia entries. Another tester who travelled the exhibit sequentially sought out quizzes and read all of the discussion posts but ignored most other content. There was too much variation in visitor preferences to determine with just five tests whether some content areas, such as news feeds, were unsuccessful overall.

Results did show that although research suggests that mobile app experiences should inspire experiences in the physical museum, the importance of using museum content to inspire
in-app experiences cannot be understated. When given free time to explore museum content with the app, most testers used just a few features and tended to stick with features they liked. When prompted by the researcher to look in the app, visitors were able to use the app to find more information and each enjoyed different aspects of the app content. Museum signage could likely serve to prompt in-app experiences by encouraging visitors to use the apps to share their stories, take quizzes, and participate in discussions. Visitors using the app may not understand the value of the app content without being explicitly told. Because visitors focus attention only on what they perceive as valuable, signage that describes the value of the app experiences (such as encouraging visitors to take the quizzes or to consult the news to understand public opinion) could be an invaluable part of bringing new content such as news feeds into the museum mobile space.

One thing that is clear is that the design is very easy to use. After the changes suggested at the end of Chapter 6 are implemented, the mobile experience could be released for free at a museum and viewership could be tracked to see what a larger sample of visitors are actually using in the app. More expansive testing over more time could better show what content areas users are interested in and actually use.
OUTSIDE EVALUATIONS
EXPLORING THE POTENTIAL FOR MOBILE NEWS IN MUSEUMS

EXTERNAL EVALUATION
BY
MIKE BLOXHAM
OF
A CREATIVE PROJECT
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
MASTER OF ARTS
BY
MEGAN MCNAMES
BALL STATE UNIVERSITY
MUNCIE, INDIANA
JULY 2013

The Evaluator

I have worked for over twenty-three years in the fields of Human Computer Interaction Research, User Experience Research and Consulting, Cross-Platform Usability Testing, Content and Interaction Concept Testing and Media Behavior Research. I have worked extensively across all media platforms and with major corporations as well as within academia. I currently hold the position of Executive Director within the Media Behavior Institute and was formerly Director, Insight and Research at Ball State University’s Center for Media Design.

In the above context I have worked with some of the leading interaction design practitioners in the world on projects intended to convey large amounts of often complex information in an easy and seamless fashion to broad audiences on an array of different devices – including mobile interactive ones. I have also worked in and with the non-profit sector and the arts so have an acute understanding of the issues and challenges
facing museums and similar institutions as they seek to engage audiences cost
efficiently with generally minimal resources.

**Relationship to the Student and Subject Matter**
I know Ms. McNames from my time at Ball State. While Director, Insight and Research
in the Center for Media Design, Ms McNames became a project collaborator on a
project run under the auspices of the “Viewing+” initiative that was intended to explore
issues relating to interactivity around TV content – either on the TV screen or via a
second screen, mobile, device. I never taught or had line management responsibility for
Ms. McNames and do not know her outside of this context.

**The Topic**
The topic chosen for this project is highly appropriate for this kind of creative endeavor.
There are two core reasons that lead to this conclusion:

- **Pace of Change / Lack of Knowledge**
  - The pace of change in terms of the number of people with high function
    smart phones and tablets is increasing rapidly – as is the level of
    innovation within App design, social media and general device
    performance. All of this leads to opportunity but also an expansion of the
    knowledge gap between what we know about existing behavior in the
    museum environment and what could be achieved with more
sophisticated tools than are currently available. The available “tour tools” currently in use are – as evidenced by the research in this project – falling far short of what is envisaged and shown to be possible by the approach taken by Ms. McNames. This project has helped to demonstrate what is possible and most likely to succeed.

• Sector Need
  o The museum sector has long since attempted to use – with varying degrees of success – different interactive technologies to engage audiences and to keep the user experience “contemporary”. The widespread use of mobile devices and Apps could well provide a lower cost and adaptable solution to the need. If best practice can be established in this area then museums and similar venues could adopt those – or even use a specifically created App template of API to develop their own – in order to create Apps which are low cost, generate revenue from visitors and sponsors alike, provide a basis for readily updated content and a means by which the museum experience can stay with the visitor after (and even before) they have made their excursion – thereby extending the reach of the museum and its relevance. By addressing these issues in this way this project shows how museums could progress in this direction.

Student’s Approach
The student’s approach was clearly extremely thorough and multi-dimensional – as evidenced by the range of techniques employed at all stages.

The process adopted was exhaustive and matches some of the better product development work I have seen – and sometimes been a part of – in industry (where decisions about investments of large amounts of money are made according to the findings of such work). The due diligence shown in this project also exceeds that of some of the Apps and other products on the market today.

**The Body of the Project**

The choice of a User Centered Design process was self-evidently the correct one for such a situation-specific and experientially-based App.

The depth and range of the work is impressively comprehensive. The use of Mind Maps and extensive sketching and prototyping to inform the product and design conceptualization from the perspectives of both the museum visitors and the staff were important steps that demonstrate a rigor in thinking and process. Similarly the task, environment and competitor analysis were all critical component of a successful project and appear to have been thoroughly executed and they are clearly communicated.

The use of both lab-based testing for the early iteration of the design and then field-based testing for the new design that was informed by results from the first, lab-based, was critical in ensuring that the findings from the field-testing were based on the “App-
in-situ” rather than any inherent failings in the App itself. In other words, the methodological flow enhanced the robustness of the findings and led to more reliable conclusions.

Similarly, the quality of the work seems high and the communication of the findings and how they were used to impact the process and inform final conclusions and suggestions for future iterations is equally clear.

**Contribution to the Field**

This project makes a timely and potentially significant contribution to knowledge in the field of interaction design for mobile Apps in the Museum environment.

Given the new and rapidly evolving nature of the mobile media space and people’s fluency of use with regard to new technologies it is important that new, empirical knowledge be created by projects such as this and widely shared.

The academic benefit of this project is clear, but it also has significant potential to benefit the museum sector itself in a very real way as it strives to leverage technologies that can engage visitors with enhanced experiences.

This is a commendable project well executed.

**Mike Bloxham:** 19 July 2013
I enjoyed reviewing Megan McNames’ creative project, “Exploring the Potential for Mobile News in Museums.” It is evident that there was a lot thought and time devoted to the project. Overall, I found the app to be clearly designed and to match the prescribed goals for the various use cases. I would have liked to see a bit more time devoted to the usability testing, but the author has made a good first attempt at creating a mobile app. Below I have presented my comments following the guidelines included in the General Form of Presentation Megan provided.

I. **Evaluator’s Credentials** – I hold a Ph.D. in mass communication from The Ohio State University and serve as an assistant professor of journalism in the School of Journalism and Electronic Media at the University of Tennessee. My research, which examines new media use and effects, has been published in numerous journals and presented at national and international conferences.

II. **Relationship to Student and Subject Matter** – I know Megan through my work with Ball State University’s summer journalism workshops. I have no direct connection to her subject matter or her work at Ball State.

III. **Evaluation of Topic** – The topic was appropriate for a creative project in a journalism program. I would love more journalistic storytelling in the project, but overall the topic is appropriate.
IV. **Student’s Approach** – The user-centered design approach that Megan followed was appropriate for the development of an app and a common process used in the UX field.

V. **Evaluation of Project** – I was not able to use the final app, but I was able to look at screenshots and read a description of the usability of the app. With that said, the app seems to be well designed and on par with other comparable apps. The only part of the project that was lacking was the usability testing. Specifically, I wish Megan had gone through more iterations of usability testing and redesigning. The user-centered design process is all about the interaction between the user and the designer. Although Megan used the user testing to make suggestions about adaptations to the app design, I think it would have been beneficial for her to run through at least one more iteration of redesign and user testing. Further, the discussion of the design process could be expanded by explaining more explicitly how the design decisions were informed by the desired outcome variables (e.g., engagement).

VI. **Contribution to Field** – Overall, the project represents a starting point for understanding how mobile apps could increase enjoyment and engagement with museums. While Megan’s project does a good job of discussing the Minnetrista app, the section of the project I read did not include much discussion of the broader application of mobile apps to the field of museum design and curating. I assume Megan discussed the broader application in the discussion section, which was not included in my evaluation packet.


APPENDIX 1

PAPER PROTOTYPING INSTRUMENT

SCRIPT TO BE READ TO PARTICIPANTS

Thank you for participating in this study. I am testing a new smartphone app I am working on so I can see what it’s like for actual people to use it.

I want to make it clear right away that I am testing the app and not you. You don’t need to worry about making any mistakes.

As we go along, I’m going to ask you several questions about your reactions to the design you see in front of you. I will also ask you how you might complete a few tasks if this design were a real, functioning app.

I want to hear exactly what you think, so please don’t worry that you’re going to hurt my feelings. I want to improve the app design, so it’s imperative that I know what you honestly think.

You may ask questions at any time.

With your permission, you will be video recorded during this study. The video will record the paper printouts, the movement of your hands as you interact with the printouts and the sound of your voice. However, your face will not appear in the video.

Data from this study will be confidential and you will not be able to be identified by the data in any way.

This study is voluntary and you may withdraw from the study at any time.

If you have any questions concerning the procedure or the study you may ask them now.

I’m going to ask you to read and sign a consent form saying that I have your permission to record you, but that it will only be seen by the people working on this project and won’t feature your face.

Do you have any questions before we begin?

QUESTIONS FOR PARTICIPANTS

Before we look at the design, I’d like to ask you a few quick questions.

First, what’s your occupation?

Do you have a smartphone such as an iPhone or an Android device?

Roughly how many apps would you say you have downloaded to your device, if you have one?

How do you use those apps? In a typical day, for instance, what kind of apps do you use and what do you use them for?

How often would you say you visit museums?
OK, we are done with the questions, and we can start looking at the design. First, I’m just going to ask you to look at this page and tell me what you think it is.

What would you click on first? Why?

What do you think these buttons in the upper right-hand corner do?

What do you think these dots here in the middle are for?

What do you think each of these icons at the bottom is for?

Now I am going to show you where you would go if you clicked on the Exhibits button. Again, I am just going to ask you to look at the page and tell me what you think it is.

What would you click on first? Why?

What do you think these buttons in the upper right-hand corner do?

Now I am going to show you where you would go if you clicked on one of the Exhibits listed here. Again, I am just going to ask you to look at the page and tell me what you think it is.

What would you click on first. Why?

Now I am going to show you where you would go if you clicked on one of the buttons on this page. Again, I am just going to ask you to look at the page and tell me what you think it is.

What would you click on this page first? Why?

What do you think these buttons in the upper right-hand corner do?

What do you think each of these buttons in the list at the bottom do?

Let’s pretend you’ve clicked on the button at the very top right of the screen. What do you expect to happen?

When you first saw this page, you said you would click on ______. I am going to show you where you would go if you clicked on that. Tell me what you think this page is. Is it what you expected?

Let’s visit each of the other buttons on that previous page. (Go to each). What do you think you would do on this page? (for each).

Let’s pretend you were walking through the museum and you saw this structure that drew your eye (place out a printout of slave pen photo), and you wanted to learn more. How would you do that?
What would you do to find a map of the museum?

What would you do to find other exhibits you might like?

What would you do to find other polls you might want to take?

Are there any other areas of this app that drew your interest? How would you get to them?

We are now done looking at the app design, and have just a few questions left.

Overall, what were your impressions of this app?

Is this something that you can see yourself using in a museum?

Is there anything else you’d like to add?

ENDING
Thank you for your participation in this study. Your feedback will help me to improve this design in the future. If you have any further questions about this app or about the research study, I would be happy to answer them.

Thank you for your time, we are now done.
Transcript: Paper Prototyping Session - Subject #1

Interviewer: What is your occupation?
Subject: Assistant Director of Admissions

Interviewer: Do you have a smartphone such as an iPhone or an Android device?
Subject: I do, an iPhone.

Interviewer: How many apps would you say you’ve downloaded to the device?
Subject: Two pages. I keep it minimal.

Interviewer: So that would be... four or five per row
Subject: About 28.

Interviewer: How do you use those apps? In a typical day for instance which apps do you use and what do you do with them?
Subject: Mostly mail, music, the apps that come on it. I am not very flashy.

Interviewer: How often would you say that you visit museums?
Subject: Probably once or twice a year, just because of what Muncie has. It’s rare that I get outside of Muncie.

Interviewer: We are done with these questions and can start looking at the design. First I am going to ask you to look at this page and tell me what you think it is.
Subject: It’s a welcome page for it looks like a museum, The Freedom Center, the title is up at the top with the Facebook, Twitter and Instagram accounts.

Interviewer: And what do you think you would click on first?
Subject: I would just start with the the top, exhibits, and see what’s there.

Interviewer: And what do you think these buttons in the upper right hand corner do?
Subject: Probably take you to facebook, twitter and instagram, their pages.

Interviewer: And what do you think these dots here in the middle are for?
Subject: They’re probably telling you that there are two other pictures (swipes finger across ad space) that are going to float though there, for an exhibit or something.

Interviewer: And what do you think each of these icons at the bottom is for?
Subject: Um, exhibits looks like it’s repeated down here, events repeated down here, bookmarks repeated down here. And then I am assuming the I is about, so everything that’s up here (pointing to list of pages) is down there (pointing to row of icons across the bottom). And I assume it stays down there no matter where you go.

Interviewer: Yes. And what would you think bookmarks means here?
Subject: If I were guessing I would say you see an exhibit that’s coming up you can bookmark it, and you can see a list of all these upcoming events so you can go back to them when they become available.

Interviewer: Now I am going to show you where you would go if you did click on the exhibits button. And again I am just going to ask you to look at the page and tell me what you think it is.
Subject: What I think the page is?
Interviewer: Yes, what you think is happening here.
Subject: It’s showing me the three featured exhibits. I wonder why that one’s the most popular.

Interviewer: And...
Subject: Are these all of the exhibits? That’s what I am wondering.

Interviewer: That’s a good question. For the purpose of this example, I am just using some of their content. In theory there could be more. It does seem kind of strange, I see what you are saying.
Subject: Yeah because there’s All at the top and I wonder if these are the popular ones or these are all of them.

Interviewer: What would you click on first do you think?
Subject: This one (points to middle image) seems most interesting to me. It’s something I identify with. Invisible: Slavery Today is kind of interesting. Journey to Freedom is probably going to be a long boring video or something, so the Underground Railroad seems to me like something that’s probably got multiple things to check out.

Interviewer: And what do you think the buttons in the upper right-hand corner do?
Subject: I would imagine they take you to all the exhibits (points to All button) or popular exhibits (points to popular button). Location, in the museum? So what wing they are in and whatnot. And then obviously the category. All of these seem to be slavery related. I guess the whole museum is slavery related. Underground railroad is what this looks like.
Interviewer: So now I am going to show you where you would go if you clicked on one of the exhibits here. And I am sorry, unfortunately I did not pick your favorite, we are going to go to Invisible Slavery Today. It’s interesting that you’re picking up on the picture. That’s really helpful. I am going to take you to where you would go if you clicked on one of the exhibits. In this case, Invisible Slavery Today. And again I am just going to ask you what do you think this page is. What’s going on here?
Subject: Seems like this is showing me all of the exhibits. I’ll bet I can scroll down here and see all of them.

Interviewer: And what do you think each of these is?
Subject: Probably just a quick preview of the exhibit.

Interviewer: And now I am going to show you where you would go if you click on one of the buttons on this page. And again I am just going to ask you to look at the page and tell me what you think it is.
Subject: What is this one? Recommended for me? How do they know what to recommend for me?

Interviewer: If you click on one of these and in this case, Slavery’s Reach, this is where you would go. And again I am just going to ask you to look at the page and tell me what you think you are seeing.
Subject: So there’s a video here at the top. I can click on the transcript, I imagine it comes up and gives me full text of what they’re saying. So join conversation I would say that’s in reference to Facebook and Twitter so I am using social media. Here’s something I can vote on, and probably the results of the votes. Maybe this is something that print media covers. I don’t know what International Labor Union would be.

Interviewer: And what do you think you would click on first on this page?
Subject: I would probably click the video and get that going.

Interviewer: And what do you think the buttons in the upper-right hand corner do?
Subject: This one looks like share (points to first button), I would imagine it pops up a message or email or whatnot. Favorite and then bookmark.

Interviewer: OK. You’re doing really well, I really appreciate it. You are doing a good job of thinking out loud. What do you think each of the buttons in this.. let’s pretend you clicked on the button at the very top, wait, so now I am going to take you to a page. Imagine you clicked on Join the Conversation.
(Clicks on Join the Conversation)
Interviewer: And this is the page you’ve been brought to. And again I am just going to ask you to look at the page and tell me what you think is going on.
Subject: Looks like it’s showing in real time what people are saying about this (points to question). They’re reacting to this conversation topic. So it’s encouraging me to reply. Is there a way? Maybe click on this (clicks icon for Tweet) and reply through this app right on this page? That’s kind of cool that you can be right there in front of that exhibit and Tweet through the museum’s app and not have to add them on Twitter and follow them or Tweet something at them, you can just do it right there.

Interviewer: Thank you, I appreciate that you think it’s cool. Now what do you think would happen if you clicked on this button here (points to Main Menu)?
Subject: It probably takes you back to, well no. I would imagine to get back to the very home screen I click this button (clicks home icon in left corner), right?

Interviewer: Mhm.
Subject: So the main menu is probably a drop down of all of these things?

Interviewer: I’ll show you. (Places drop down).
Subject: Oh, OK.

Interviewer: But that’s not what you were expecting?
Subject: No, but that was on the previous screen. OK.

Interviewer: I am going to, let’s imagine you click the back button and I am going to bring you back here. What do you think happens again when you click on the Poll button?
Subject: I imagine there’s some kind of poll question to vote on or respond to.

Interviewer: Yes, that’s where you would go. What would you do here?
Subject: I would tap to fill in the bubble and then submit my vote.

Interviewer: And what do you think would happen then?
Subject: Um, I don’t know whether it would take me automatically to see the results or if I have to click it there (points to results button at bottom). But I would imagine once I vote it will take me there.

Interviewer: Yes. Now let’s say you wanted to go back to the list of everything that’s in the exhibit. Remember that one?
Subject: Yes.

Interviewer: Do you know how you would do that?
Subject: Everything that’s in this exhibit? Probably that main menu button again.

Interviewer: That would give you this. Which would you choose?
Subject: Overview.

Interviewer: I am going to take you back out once again to here. let’s imagine you clicked on the News button. Can you tell me what you think is happening here?
Subject: These are big media outlets that are publishing stories about slavery, it looks like.

Interviewer: Excellent, yes. And what do you think these buttons would do?
Subject: It looks like those are all bookmarked. I don’t know if they are already bookmarked or if I would have to click that to bookmark. Maybe I would know if I bookmarks it if they were like, hollow first?

Interviewer: Mhm. That’s what I just wrote down. That’s so helpful, if they were greyed out or something. I didn’t even think about that, which is why I am doing testing. Let’s pretend you are walking through the museum and you saw this structure. Do you see the building in there?
Subject: Yes.

Interviewer: And it drew your eye, and you wanted to learn more about it. How would you do that?
Subject: If I was walking through the museum? I would look around for the plaque, the sign that probably has a story or look for a curator.

Interviewer: OK. Now let’s imagine that you had the app open, let’s go back to the front page. Where do you think you could find information about this in here?
Subject: Probably exhibits.

Interviewer: OK, which would take you here.
Subject: Mhm. And then, that’s kind of a big structure, maybe it’s in popular?

Interviewer: OK. So, this actually uncovers a problem, which is that you probably wouldn’t know what it’s in.
Subject: Right.

Interviewer: Unless you knew what exhibit it was in.
Subject: Yes.
Interviewer: Because of that problem I am going to have to bump you kind of to it’s page without going through the steps since you don’t know the steps. Now you are here, you found the page in the app, what do you think is happening on this page?
Subject: This is like a digital curation it looks like. It looks like there are two other pictures in here (swipes across pictures) so even if I am not at the museum, I can be looking through this thing. Or even if I am at the museum there’s other pictures to tell me things to look at while I am walking around, making sure I am picking up on all the big things.

Interviewer: Yes, absolutely. And how about each of these.
Subject: I am guessing this thing’s story is on Wikipedia, and then it’s mentioned in the news, local news. I can see if there are other structures in the museum if I click on that (points to see similar) and then I can see if anything else is in this area.

Interviewer: Excellent. Now let me take you back out to the front. Where do you think you would find a map of the museum?
Subject: Probably exhibits.

Interviewer: OK. And what would you do to find other exhibits you might like? Let’s say you’ve been at the museum for a bit, using the app and you are thinking where can I find other exhibits that I might like? It might not be on this page, think back to all that you saw.
Subject: I would think on this one (slave pen) if I enjoyed this exhibit I can at least see nearby exhibits. And see what else is in that time period of history. Other than that, just looking at the list of exhibits and seeing what pops out or those news articles that were mentioned, seeing if something stands out there. I forget, is there a way to see what people are Tweeting about as they go through the museum?

Interviewer: No there isn’t. Are there any other areas of this app that drew your interest that we didn’t look over?
Subject: The about section. Did we talk about that?

Interviewer: No. How would you get to the about section?
Subject: Click on the I at the bottom.

Interviewer: OK, that would take you here. Is that what you expected?
Subject: Mhm.

Interviewer: And what do you think is happening here?
Subject: It’s pretty straight forward. I would imagine this would tell me how much to get in, group rates and what not. Hours, and directions are pretty simple. I, when I am looking at this, I am wondering, why are all these things a separate menu item? It would only take one or two lines of text to say admission is this or this. If this is actually the size of the device’s screen, you can probably get a lot of this stuff on there. Except maybe how to use this guide, or map. I feel
like hours and directions, if I were going to this page I would, I am looking for hours, if I could just do one less click and it was just on there, that would help me.

Interviewer: That’s an excellent observation. We’ve almost seen everything. What do you think will happen if you click on this button?
Subject: It will take me to the exhibits I’ve bookmarked.

Interviewer: Yes you’ll see that. And what do you think is happening here?
Subject: It looks like when I bookmarked them I think? No, maybe when they open. I don’t know. I see May 20th but I don’t know if that’s when the exhibit opens or when I was there and bookmarked it.

Interviewer: OK. And what do you think will happen if you click on each of these?
Subject: It will probably go to their page and just like this one, has more information.

Interviewer: And what do you think would happen if you click on, let’s say, category?
Subject: If I bookmarked a bunch of them, I imagine it would organize them by category.

Interviewer: And what kind of category do you think it would be?
Subject: I don’t know, what kind of categories are there? Because if it’s the Freedom Center, I’ve only been there once and I would think it’s all about slavery and so there’s one category.

Interviewer: OK, we just have a couple left. Let’s imagine you click on the calendar. What do you think this page shows?
Subject: Uh, looks like a speaker and then another speaker. Looks like speakers coming up on May 20th and May 31 and I can click on those and learn more about the speaker and more about the topic.

Interviewer: Yes you can. That would take you here.
Subject: OK.

Interviewer: And how would you describe what’s happening here?
Subject: OK. Right off the bat I see the title and how long it’s there, a description leading up to the event, that’s the about, I see price – free for members, awesome. And then sponsors, yeah, it’s pretty straightforward. I can share this with somebody (points to share button). I can email it and say he’s let’s go check this out or bookmark it to come back later (points to bookmark).

Interviewer: Yep! OK, so we’re done looking at the app. I have just a couple final questions. Now that we’re done looking at the design I have just a couple questions. Overall, what’s your impression of the app?
Subject: I like it. It seems very clean. Very user friendly. I like that on every one of these there’s a back button. I don’t know if it’s the same on all devices but I know on my iPhone any time I want to go back it’s top left. It makes sense.

Interviewer: And is this something that you could see yourself using at a museum.
Subject: Absolutely.

Interviewer: And is there anything else that you’d like to add? That you think will help me as I try to improve the design?
Subject: No I think we covered it. Awesome job.

Transcript: Paper Prototyping Session - Subject #2

Interviewer: This is what you would first see on the screen, but then that would switch automatically to this. I am just going to stack all the other screens up here. Before we talk about this I’d like to ask just a few quick questions. First of all, what’s your occupation?
Subject: I am the assistant director of journalism workshops at Ball State.

Interviewer: Do you have a smartphone such as an iPhone or an Android device?
Subject: I do, an iPhone.

Interviewer: OK, and roughly how many apps would you say you’ve downloaded to your device? A ballpark figure is fine.
Subject: Maybe 30.

Interviewer: And how do you use those apps? In a typical day which of those apps do you use and what do you use them for?
Subject: Can you start over with the question?

Interviewer: Oh sure. I am asking how you use those apps. So in a typical day which apps do you remember using and what do you do each day. Or are there any that stand out to you as must-have apps that you use all the time?
Subject: I like my bank one. I like seeing my money. Spotify, I think is pretty great. The weather one. And, Facebook and Pinterest. Those are the main ones, other than mail and stuff like that too. And text messaging I guess.

Interviewer: Yeah, definitely. And how often would you say you visit museums?
Subject: Um, I guess not actually that often unless I am on vacation mostly.
Interviewer: Mhm. So we are done with those questions and we can start looking at the design. First I am just going to ask you to look at this page and describe to me what you think it is.
Subject: Um, I guess it’s a welcome page. And, just the main navigation for the app.

Interviewer: OK, and what would you click on first?
Subject: Um, I don’t know, am I in a museum?

Interviewer: Yes, this is an app where you don’t necessarily need to be in the museum but for the sake of the study pretend you are visiting and you just got there and opened this up.
Subject: I probably would go to the exhibits and see which ones there are.

Interviewer: OK. And what do you think these buttons in the upper right-hand corner do?
Subject: Um, the first button goes to Facebook, the second button goes to Twitter and the third button either Instagram or just a photo gallery.

Interviewer: OK, this is very helpful. And what do you think these dots here in the middle are for?
Subject: Um, slide through pictures. Like change out the welcome image.

Interviewer: Mhm. So now I am just going to, oh, well, what do you think each of the icons on the bottom is for?
Subject: Um, the first one will go back to this main page. The second will also go to exhibits, the third one will go to the calendar events and then bookmarks, and the about.

Interviewer: OK, thank you. Now I am just going to show you where you would go if you clicked on the exhibits button. And so this is where you would go. Again I am just going to ask you to look at this page and tell me what you think it is.
Subject: Um, it’s the exhibits page and I would say each one is a different exhibit and then you can sort through popular, location or category.

Interviewer: Yes, I was going to ask you what the buttons in the top corner do. What do you think would happen if you clicked on Popular.
Subject: I think the most popular would be at the top and then it would go down from there.

Interviewer: OK, what about location?
Subject: That it might just divide them up into different locations, or there might be another button that lists each location.

Interviewer: OK, what about category?
Subject: Again, same as location, it might just have another list of each category.
Interviewer: OK, now I am going to show you where you would go if you clicked on one of the exhibits, in this case Invisible Slavery Today. And again I am just going to ask you to look at this page and tell me what you think it is.

Subject: Now this is the main exhibit page for Invisible: Slavery Today. And it’s just got all of the different information that you can learn about the exhibit, starting with introduction and I am not really sure what else to say.

Interviewer: OK. What would you click on first?

Subject: Um, I guess I would click on introduction because that sounds like a pretty good place to start. Now I am going to show you where you would go if you clicked on one of the buttons on this page. In this case we’re going to go to Slavery’s Reach. And again I am just going to ask you to look at this page and tell me what you think is happening on it.

Well, there’s a video at the top that I could watch. And I would say beneath that is the transcript of whatever is being said in the video. And then beneath all of that is all of the different ways I can interact with this exhibit or piece of the exhibit. And...yeah. And I can scroll.

Interviewer: What would you click on this page?

Subject: Um, I think I would click first to watch the video.

Interviewer: And what do you think the buttons in the upper right-hand corner of this page do?

Subject: Um, let’s see. The first one I think would maybe share or allow you to share this video somehow. The second one would allow you to love or like this video. And um, the last one is to bookmark it.

Interviewer: OK. Now let’s pretend that you clicked on, well, when you said that when you first saw this page you would click the video, what do you think would happen if you clicked it.

Subject: I think the video would start playing and the transcript would probably scroll, like you would see on a video that has subtitles. It would just start scrolling or changing out.

Interviewer: OK. Now I am going to show you where you would go if we clicked on join the conversation. And this is where you would go. Once again I am just going to ask you to tell me what you think this page is.

Subject: Um, it’s just a comment page. Sorry this part threw me off (points to drawn in part). it’s just a comment page or like a Twitter Feed. Yeah now that I look at it, it’s definitely a Twitter feed.

Interviewer: And what do you think is happening in that Twitter Feed?

Subject: Just that it’s just being, it’s pulling in all of the hashtags of Invisible Slavery and Freedom CenterTalk. And, just the most recent.
Interviewer: OK. Let’s go back to this page here. And visit each of the other buttons on this previous page. So went to Join the Conversation. Where else would you like to go? Subject: Um, let’s go to Poll Next.

Interviewer: OK. And what do you think is happening here? Subject: It’s just asking me to participate in a poll and, it’s just getting feedback from me and the rest of the people looking at the exhibit.

Interviewer: Sure, and if you wanted to participate, what would you do? Subject: Um, I would choose one of these five bullets and then vote and then I click here to see the results.

Interviewer: Yes. These are your results. What do you see here? Subject: Um, it’s showing me in a pie chart of the results of what everyone who has taken this poll are saying.

Interviewer: Mhm. And if you wanted to go back, so we looked at Join the Conversation and now the Poll, if you wanted to go back and see the list of other things on that page you can look at, what would you do? Subject: I would hit this button (back).

Interviewer: OK, let’s go back. Where would you like to go next? Subject: Let’s just go here to Data.

Interviewer: OK. What do you think is happening on this page? Subject: Um, This is just showing me just a chart of forced labor by region.

Interviewer: OK, let’s go back. And what’s left. Subject: News.

Interviewer: OK, and what do you think is happening on this page? Subject: Um, I’d say this is sort of like a reader. It’s pulling in different news articles relating to slavery, ordered most recent.

Interviewer: And what do you think these buttons here do? Subject: You can bookmark the article for later.

Interviewer: And what do you think would happen if you clicked on one of those bookmark buttons?
Subject: Um, I think it would save it in a bookmark folder that I can get to by clicking on that (points to bookmark icon on bottom).

Interviewer: OK, and what do you think this button here does.
Subject: This button would take me back to the home I think.

Interviewer: OK, now,
Subject: Well, I guess it could take me back to the main exhibit page. But, I don’t know.

Interviewer: Here’s what happens, it’s a drop down. But that’s not what you expected?
Subject: No. I think maybe if there were an arrow or something I would have expected that.

Interviewer: So we’ve looked at all of the items in the list except the last one. Where do you think that last one will go?
Subject: The International Labor Union one? I think as I said before you scroll up. But I have no idea. Unless it just goes to the International Labor Union Website.

Interviewer: OK. So we’ve looked at all of those. Now what I want to do is imagine you’re at the museum and you’re walking through the museum and you see this structure and you wanted to learn more about it. What would you do?
Subject: Um, you mean on the app? Or just in general? I would probably go up to that guy. He looks like he knows what he’s talking about.

Interviewer: OK. And then if you had the app with you how do you think you would learn more about it in there?
Subject: Um, I guess...I would hit...now I don’t remember if that’s in Info? I don’t know.

Interviewer: OK, that might be my biggest problem.
Subject: Unless you can maybe search on it.

Interviewer: I’ll go ahead and show you if you were able to find it, the page you would be on. Can you tell me what you think is happening on this page?
Subject: Um, I mean I guess everything, you could go to the Wikipedia article about the slave pen, you can learn news about it and then find other objects like it at the Freedom Center. Um, but I mean it’s just things about that piece of the exhibit.

Interviewer: And what would you do to find a map of the museum?
Subject: I think I would maybe just click on see nearby objects, maybe that would pull up a map? Or you could probably go to the about.
Interviewer: I can take you to the about page.
Subject: Yep, there’s the map. Yay, I was right.

Interviewer: Yes.
Subject: I did think about going to the about page first, the main page, but I don’t know. I think I would probably explore the app.

Interviewer: OK, now let’s say you were in this exhibit looking at this structure and you want to find other exhibits you might like. What would you do?
Subject: I think I would either go to this map or on the other page (slave pen) I would click one of these (see nearby and see similar).

Interviewer: Are there any other areas of this app that drew your interest that we didn’t look at?
Subject: Um, I’d like to learn about what the events page is.

Interviewer: Sure. Is that what you expected?
Subject: Yeah, I think, either that or an actual calendar. I am not sure what you filled in here (points to arrows).

Interviewer: They’re supposed to be these arrows.
Subject: I thought maybe you could select them and somehow press a button and it would go to your calendar. That would be cool.

Interviewer: If you click on one of those you would go here. I didn’t think about this when I designed it but I’d like to have maybe at the bottom like, or something where you can add this to your calendar. Maybe a share button?
Subject: I don’t know that I would know.

Interviewer: OK, there’s just one more place I want to look, and that is if you click on this bookmark button here. It would take you to this page. What do you think is happening on this page?
Subject: Um, I think that’s everything that I’ve bookmarked. Yeah.

Interviewer: OK, so we are now done looking at the app design, so I have just a few questions left. Overall, what were your impressions of this app?
Subject: I think it’s a clean design, and um, I think it’s a cool concept for like, interacting with a museum. And I probably would prefer this than going up to that guy sometimes. I like to find things on my own or do things on my own at museums.

Interviewer: What did you think maybe didn’t work so well in this?
Subject: Um, I’d say what you probably already know, but yea, I don’t think I would have thought to go to the about page for the map. If I were on the about page I would expect the map to be there. But I don’t think that that would be the first place I would look for one I guess.

Interviewer: OK. And is this something that you could see yourself using at the museum?
Subject: Definitely. Yeah. Like I said, I think it’s more interesting to learn about things this way. You still get the audio and stuff but you can learn by hearing, by watching a video and stuff, but you can kind of do it on your own time. And even with the bookmarks you can learn about it more after you’ve visited the museum you can come back to it. And it’s just interesting to see how other people are interacting with the exhibits even though I may not necessarily want to be with somebody when I am walking through the museum, so that’s kind of cool.

Interviewer: OK, and is there anything else that you’d like to add?
Subject: Um, I don’t know. I think that’s it. Nice job.

Interviewer: Thanks!

Transcript: Paper Prototyping Session - Subject #3

Interviewer: Before we look at the designs I’d like to ask you a few quick questions.
Subject: OK.

First of all what is your occupation?
Subject: I am a student.

Interviewer: Do you have a smartphone such as an iPhone or an Android device?
Subject: I have a Windows phone.

Interviewer: Do you know what model?
Subject: No.

Interviewer: Do you have apps on that phone?
Subject: I can get apps but not as many as Android or iPhone.

Interviewer: OK. And how many apps would you say that you’ve downloaded?
Subject: Two or three.
Interviewer: OK. And how do you use those apps on your phone? You can include the apps that came with it, not just the ones you’ve downloaded. On a typical day for instance what apps do you use on your phone?
Subject: Um, Facebook and Twitter.

Interviewer: OK. How often would you say you visit museums.
Subject: I do not visit museums that often. In high school I did a lot with field trips.

Interviewer: We are done with those questions and we can start looking at the design. When you first open the app this is what you would see and then it would change to this. First I am just going to ask you to look at this page and tell me what you think is happening here.
Subject: This looks like a menu. This looks like a loading screen. And then the menu. And these all look like buttons you can press or touch (points to list in middle of page).

Interviewer: Yeah.
Subject: And this is telling me I am on the homepage because it’s different (pointing to home icon with yellow background).

Interviewer: OK, and what do you think you would click on first?
Subject: Well, it would depend on where you were. If you were like in your car before visiting the museum you could click on this (about) but if you were actually in there maybe exhibits.

Interviewer: Mhm. That’s a really thoughtful answer. What do you think these buttons in the upper right-hand corner do?
Subject: I am sure they connect you to Facebook, Twitter or Instagram. But I don’t know if it would take you straight there or whatever you see on your screen would be posted.

Interviewer: OK, and then what do you think these dots here in the middle are for?
Subject: There’s probably two more pages you can scroll to. I don’t know where they would go to though.

Interviewer: OK. And what do you think the icons on the bottom are for?
Subject: Exhibits, events, bookmarks, about.

Interviewer: OK, now I am just going to show you where you would go if you did click on the exhibits button. And again, I am just going to ask you to look at the page and tell me what you think it is.
Subject: OK, so museums they have like, different exhibits that come in, like the underground railroad. Like, special exhibits that go on tour. So maybe if it was in town that would come up on this list. If you click on that you’ll see like more things inside that exhibit. This probably just shows you what’s there.
Interviewer: Yes, you are right. It’s showing you exhibits you can go to that day. And, what do you think the buttons in the upper right-hand corner do?
Subject: Um, I am sure they mean what they say. This one shows all the exhibits in the museum, the most popular ones, which I guess people can rate on the app, by location where you are in the museum like one here one here, then like, category. I don’t know if by category that means they’re all about slavery.

Interviewer: Have you ever been to the Freedom Center? The whole museum is about slavery and the modern day repercussions of it.
Subject: Then maybe categories are like, women in slavery, et cetera.

Interviewer: This is really helpful to hear what you were expecting. Now I am just going to show you where you would go if you clicked on one of the exhibits listed here. In this case, we’re going to go to Invisible: Slavery Today, the first one. And again, I am just going to ask you what you think is happening on this page.
Subject: Well, it looks like there’s more because it’s kind of cut off, so maybe you could scroll up or whatever. Um, but it probably goes in order of introduction, like about, slavery today. And then I don’t know that these would be for. I am sure they all have to deal with the Invisible Slavery: Today but I don’t know how this relates to that.

Interviewer: OK, I see.
Subject: Maybe Slavery Research and Types of Slavery could go into all of those (the list on the previous page).

Interviewer: I see what you are saying.
Subject: I like How You Can Help.

Interviewer: What do you think How You Can Help is?
Subject: I am sure it answers frequently asked questions and stuff, maybe about what you are looking at or more to use for the app. Like how to get to stuff.

Interviewer: OK. And now I am going to show you where you would go if you clicked on one of these, and in this case we’re going to go to Slavery’s Reach. And again, I am just going to ask you to tell me what you think is happening on this page.
Subject: It looks like a video and this is a transcript. Join the Conversation, that could be a social network thing, like Tweeting about it. Polls, that could be um, how many people like it or not. And news could be news today about it. Data could be more information about it or statistics maybe. Up here this is to bookmark it, like it, I don’t know what this (share) is. And that’s the Back button. I don’t know what International Labor Union is.
Interviewer: OK. So, um, on this page you went down the list here and talked about what each of these things might do. Go ahead and select one and we’ll look at where that goes. Which would you like to start with? 
Subject: I’ll do Poll.

Interviewer: OK that brings you here. What do you think is happening on this page? 
Subject: Um, it’s a poll.

Interviewer: Is this what you expected to see? 
Subject: Yes.

Interviewer: And what would you do if you wanted to participate in the poll? 
Subject: Click which one and then Vote. Then see the results.

Interviewer: And these are the results. Is this what you expected to see. 
Subject: Well I mean, these are results and I can see that. It could have been a bar graph or something but I like the pie graph.

Interviewer: Let’s go back and why don’t you choose another one from the list. 
Subject: Join the Conversation.

Interviewer: OK, that will take you here. What do you think is happening on this page? 
It’s like a Twitter Feed. Kind of. I see, I don’t know if this is Twitter or, like maybe it’s its own chat within the app. Because it’s not the same color and the user profiles are circles not squares but I see hashtags and the @ symbols. And the time updated, so it might be Twitter.

Interviewer: OK and what do you think this button down here does? 
Subject: You can post your own comment.

Yes. Let’s go back here and then what have you not clicked on yet? 
Subject: Data.

Interviewer: And what do you see that this page is doing? 
Subject: Showing me a graph. OK, so it says 2012 Estimated Forced Labor By Region. So it’s saying, today, Asia and Pacific has close to 12 million slaves still. So it just gives you more information about slavery today.

Interviewer: OK, let’s go back. Which one is left? 
Subject: News.
Interviewer: Let’s go to News. What do you think is happening on this page?
Subject: I see bookmarked things. I don’t know if maybe that’s what other people bookmarked? Or I bookmarked? But it’s talking about slavery and sex trafficking. So, it’s more news today about what’s going on today. And it posts when these were posted.

Interviewer: What do you think this button here does?
Subject: The Main Menu?

Interviewer: Yes.
Subject: I would say it would take you back to the homescreen.

Interviewer: OK, it actually does this (shows dropdown). What do you think is happening there?
Subject: I don’t know. I guess this would take you back to the home screen (points to home icon on bottom). If this is the main menu, I don’t know what overview is. Because Join the Conversation, Data and News are here (points to previous page). I don’t know where Overview comes from.

Interviewer: OK, that’s really good to know. We’ve been through all those. Let’s pretend you are walking through the museum and you saw this (places slave pen photo) structure. And it drew your eye and so you were walking through the museum and you saw this structure and it drew your eye, and you wanted to learn more about it, how would you do that?
Subject: Well with the app I could probably find it on here.

Interviewer: How would you go about finding it?
Subject: I would first want to find out which exhibit I was in. Then look for it on the Exhibit page.

Interviewer: And then what would you do if you wanted to find a map of the museum?
Subject: Maybe in the About?

Interviewer: If you clicked on About this is where you would go.
Subject: Yeah, I see Map right there.

Interviewer: What else do you think is going on on this page?
Subject: It shows you how to use the app. And then it shows the map, About the Freedom Center, hours and directions, that’s self explanatory. Admission how much it costs to get in, how to donate if you wanted to and copyright, which, is that the copyright of the museum or the app?
Interviewer: The materials that are in the app. That’s a good question. It’s interesting, some museums don’t own the copyrights to the stuff in their exhibits because the people who are loaning the items to the museum to be displayed still own it.
Subject: That’s cool.

Interviewer: So the copyright can be kind of crazy sometimes. Are there any other areas of the app that drew your interest that we haven’t looked at yet?
Subject: Events.

Interviewer: That takes you here. What do you think is happening here?
Subject: It shows that on May 20 there’s going to be a speaker and then on May 31st there’s going to be Stephen Marc, which I am not a history buff so I don’t know if he’s historical or if he’ll be there.

Interviewer: OK, and if you click on the Stephen Marc section, what do you think will happen?
Subject: Well, it will give you more information about it. I don’t know if he’s a speaker too or if there’s an exhibit about a guy.

Interviewer: That brings you here. There’s just one more place I want to go. What do you think will happen when you click on the bookmark button?
Subject: Well throughout the app I see the bookmarks in the corner. So maybe if you click it it will save it and if you go to Bookmarks it will be there.

Interviewer: There’s the bookmarks page, is that what you expected to see?
Subject: Yes.

Interviewer: And what do you think is happening on this page?
Subject: Well on previous pages if you saw a bookmark and bookmarked it it showed up on here. And then instead of going through everything you can just click the bookmark and go straight to whatever you are trying to find.

Interviewer: Yes. OK, is there anywhere else in the app you wanted to look at?
Subject: No.

Interviewer: OK, we are done looking at the app design and I have just a couple quick questions. First overall what were your impressions of the app?
Subject: Um, it’s very clean I think. It looks good as well.

Interviewer: And are there any things you think didn’t work or weren’t a good idea or weren’t clear?
Subject: I don’t think so. The Main Menu but I just, I would expect if I pressed Main Menu I would go to the home, even though there is home button.

Interviewer: And is this something you can see yourself using in a museum?  
Subject: If I went to a museum then yes.

Interviewer: Is there anything else that you’d like to add?  
Subject: I don’t think so.

**Transcript: Paper Prototyping Session - Subject #4**

Interviewer: Before we begin looking at designs, I’d like to ask you a few quick questions. First of all, what is your occupation?  
Subject: I am a learning technologist associate.

Interviewer: And do you have a smartphone such as an iPhone or Android device?  
Subject: Yeah, I have an iPhone 4.

Interviewer: And roughly how many apps would you say that you’ve downloaded to your device?  
Subject: Probably like 10 or 11.

Interviewer: OK, and how do you use those apps? Or the apps that came on the device? So in a typical day for instance what kind of apps do you use and what do you use them for?  
Subject: I use two different social media apps, for socializing. There are two games I play non-stop: Candy Crush Saga being the major one. And then I use Instagram. I like to take pictures. And that’s really the apps I use.

Interviewer: What are the two social media apps?  
Subject: Facebook and Twitter.

Interviewer: And how often would you say that you visit museums?  
Subject: A couple times a year.

Interviewer: OK, that’s all I have. We are done with those questions and we can start looking at the designs. So, this is the first screen that you would see, but this would then change and become this screen. So this is the first page of the design then. So first I am just going to ask you to look at the page and tell me what you think it is.  
Subject: This is just telling me I think how to get to other pages. There’s obviously two more because of those dots, that I can’t see. But this is just the home, right?
Interviewer: Yes, that’s correct. And what do you think you would click on first on this page?
Subject: The calendar. I am already there, I want to know if there’s anything interesting going on today.

Interviewer: And what do you think the buttons in the upper-right-hand corner do?
Subject: Um, they can send me or something to Facebook, Twitter and Instagram. Maybe check me in on there?

Interviewer: OK, and what do you think that each of these icons on the bottom is for?
Subject: Well, homepage is where I am. Exhibits is probably describing the exhibits and telling me where they are. The calendar is probably telling me about special events. And bookmarks is probably events I want to remember, well, not events, but exhibits I want to remember and the I is information. I feel that these (points to icons on the bottom) probably sync with these four (points to list in the middle of the screen). They’re probably the same but it’s just if you want to see a picture or not.

Interviewer: OK, now I am going to show you where you would go if you did click on the exhibits button. And again, I am just going to ask you to look at the page and tell me what you think it is.
Subject: These are the exhibits that I can go see. This is probably, I think this is probably all of them. There’s only three but if there were a lot maybe I could click the others (points to sort buttons) to filter them.

Interviewer: OK, and then what do you think each of these buttons that you said would filter would do specifically?
Subject: It would probably list them by popularity, and then by location in some kind of spatial reasoning way, like from one side of the museum to the other. And category seems like this whole museum is about slavery but it might organize them according to that.

Interviewer: OK. Now I am going to show you where you would go if you clicked on one of the exhibits listed here. And it’s going to be the first one, Invisible: Slavery Today. And again, I am just going to ask you to look at the page and tell me what you think it is.
Subject: Um, these are all the parts of Invisible Slavery. So once I go inside I think these are the different parts of the exhibit I would see.

Interviewer: And what would you click on first here?
Subject: The introduction.
Interviewer: Now I am going to show you where you would go if you clicked on one of the exhibit items, which you’re correct, they’re different parts of the exhibit. And again, I am just going to ask you to look at the page and tell me what you think it is.
Subject: Well the top is telling me about it, like the old-timey headphones you have in the museum. And then I am assuming down below it’s like a message board for Join the Conversation and a Poll. I think that’s ways to make it interactive. I am not sure what International Labor Union would be. These are probably just supplemental.

Interviewer: Yes. And what do you think you would click on this page first.
Subject: Well, the video first. I want to hear what it has to say.

Interviewer: And what do you think these buttons here in the corner do?
Subject: The first one is how I could share it with people on my phone. Heart probably maybe sends it to … I don’t know what heart does. But bookmark would put it in this list down here (points to bookmark icon on bottom of screen). Heart I don’t know, I guess it would just indicate that I love it but I don’t know where that goes.

Interviewer: OK. And then when you first saw this page, you said you would click on the video first. But I am going to show you where you would go if you clicked on some of these items down here (points to list). Which one would you like to check out first?
Subject: Data.

Interviewer: OK, this is where you would go. What do you think is happening on this page?
Subject: Um, well I am assuming what I just saw, the exhibit that I am watching is about forced labor and slavery. So this is probably telling me where the most is. It’s comparing them.

Interviewer: I am going to take you back out. And which of these would you like to click on next?
Subject: Join the Conversation. I want to know what other people are saying about it.

Interviewer: So that’s what you think is going to happen?
Subject: Mhm. I think it’s going to be like a message board.

Interviewer: This is where you would go. What do you think is happening here?
Subject: Oh, man! This is people tweeting about it, right?

Interviewer: Mhm.
Subject: I didn’t expect that.

Interviewer: OK. What do you think would do on this page?
Subject: I would see what other people thought about it. And then if I thought something was cool I would use this little icon to tweet myself.

Interviewer: OK, and then let’s take you back out. What have you not clicked yet?
Subject: Poll.

Interviewer: OK, I’ll take you to the poll. And then what do you think is happening on this page?
Subject: Well, I think it’s polling all the people who see the exhibit. I don’t know if you do the poll before or after you watch the video though. I guess you can choose. But I think that might change my answer.

Interviewer: OK, and what would you do if you wanted to participate in the poll?
Subject: I would click on these radio buttons and click vote.

Interviewer: Then what do you think would happen?
Subject: I think it would take me to the results. I think I can see the results without clicking if I click here (points to See Results button), but it would take me.

Interviewer: Yes.
Subject: Yay!

Interviewer: It will take you to the poll results here. Any comments on this page?
Subject: I like this one, I think maybe this is a good page. It’s really clear. Because I am like, ‘oh, that’s what I just answered.’ My question is, does it change because of what I just clicked? Does my data go in it?

Interviewer: Mhm. That’s a good question, that tells me I haven’t let you know your vote.
Subject: Yeah, who are these people voting?

Interviewer: And now I am going to take you back to the main page. The last one is...
Subject: News, right?

Interviewer: Yes. So again, I am just going to ask you to look at the page and tell me what you think is happening on it.
Subject: I don’t know where, who gathered these things. But someone has gleaned some of the main news stories relating to the exhibit in one way or another. So it’s probably just the ones that are out there and the most current, because it tells how recently this was posted. So that’s good too.

Interviewer: OK, and then what do you think these buttons here will do?
Subject: I think they will give you the option to bookmark it. Can I share it once I’ve bookmarked it? I guess I would have to read it first. I wouldn’t want to just share it.

Interviewer: I kind of laughed because I don’t have an answer. Subject: The problem is I would not share just the headline. So I don’t need a share button yet.

Interviewer: OK, and now what do you think this button in the upper-right-hand corner here does? Subject: It will take me to the first one that I saw, the homepage I think.

Interviewer: OK, this is what it actually does, it makes this screen. Subject: Oh, it takes me to the main of this screen of this exhibit. That’s not what I expected.

Interviewer: OK, let’s take that away. Subject: Oh I get it, that (main menu) wouldn’t be that (homepage) because I still have this option (points to home icon in bottom left corner). OK.

Interviewer: So that is everything here from this page. Um, next I would like to kind of have you imagine that you are walking through the museum and you come across this structure. If you wanted to know more about this structure in the museum, what would you do? Subject: Based on the options I have on my app?

Interviewer: Or, if you don’t want to use the app, what you would normally do. Subject: Well, this guy in the middle looks important, so I would probably first listen to what he’s saying and he doesn’t answer my question and the crowd disperses, I would just ask him.

Interviewer: OK. Subject: I think I might also look and see if there are any signs around it.

Interviewer: OK, and if you wanted to then go to the app and see if there was more information there, how would you do that in this app? You have all the pages here so if you need to go back to a page where you can remember where you think it might be, you can flip through. Subject: I guess, um. I guess maybe location. I would go to the exhibits page and go to location.

Interviewer: OK. Subject: Because I don’t know where it is in here (points to designs). Am I still in the Slavery’s Reach exhibit area?

Interviewer: Well no, I am having you imagine that you are just in the museum wandering around and you saw this.
Subject: Then yeah, I guess location and I am just going to hope there’s like a picture of it.

Interviewer: OK. Yep. And then what would you do if you wanted to find a map of the museum?
Subject: Probably About. I am hoping that has the map.

Interviewer: I’d like to take you to that page. There you go.
Subject: Oh, it’s in Freedom Center, not About. Which was that on the bottom of that page? Or maybe it’s this one, something said that on it and I was like, I don’t know what that is?

Interviewer: Oh, it’s in the hashtags here.
Subject: Oh, the museum’s name is Freedom Center. I didn’t understand that.

Interviewer: I probably could have told you which museum you are pretending to be in.
Subject: That’s OK, it wouldn’t be confusing to anyone else though, because if you are there you know that.

Interviewer: Well, unless you are like in a high school field trip and you end up there. Sorry. And is this page what you expected to see?
Subject: Yes, this is helpful.

Interviewer: OK, and now I just want to have you take a look at some of the other pages so let’s imagine, when you first started you said you would probably click on calendar to look at events.
Subject: Mhm.

Interviewer: So I’d like to imagine that you’ve done that and take you to the events page. Which is this. Can you tell me what you think is going on here?
Subject: Yeah, these are the upcoming events at the museum, speakers, and these are the dates that they are coming. So it’s arranged by what’s the soonest.

Interviewer: OK, and if you wanted to know more about the Stephen Marc event, what would you do?
Subject: Click on this little radio button.

Interviewer: Yes, I drew those in nicely didn’t I. And what do you think is going on here?
Subject: This is explaining more about the event and giving vital information. It also says how much it costs to get in.

Interviewer: And what do you think these objects in the corner do?
Subject: Oh, I can bookmark it, and it will come here (points to bookmark icon on bottom). So when I get home and think, ‘What was that event I wanted to go to?’ I can click down here. I can also share it, probably through Facebook or Twitter.

Interviewer: And then, one more. What do you think will happen if you click on this button here (points to bookmark icon)?
Subject: I think all the things I bookmarked along the way might come up. And I think there might also be some preloaded ones, but I don’t know that for sure.

Interviewer: OK, it will take you to this page. And what do you think is going on on this page?
Subject: Uh, this is all the bookmarks I put in probably. And it’s all of them arranged by … mm I don’t know how they’re arranged, but they are all arranged.

Interviewer: As soon as you said that I realized I didn’t put them in the right order.
Subject: But I can sort them by location and category.

Interviewer: What do you think will happen if you sorted it by category?
Subject: I think that like all the speakers will be together, the polls will be together, discussion.

Interviewer: OK, Alright, is there anything else that you saw in this app that you were interested in taking a look at, that caught your attention?
Subject: (Flips through app). Um, no I don’t think so. I am curious about what the other two (images on first page) are.

Interviewer: My plan for that page was that they could be anything the museum thought people would be interested in, kind of leaning towards ads for new exhibits.
Subject: Oh, yeah, OK.

Interviewer: So that when you get there there’s a welcome but then it’s like you know, ‘Don’t forget to come back in April for Dinosaurs or whatever.’
Subject: Mhm.

Interviewer: So now we are done looking at the design of the app and I just have a few questions. First of all, what was your overall impression of the app?
Subject: I think it was really easy to use. It was really straight-forward. And mostly self-explanatory. I think it would be really helpful if I went to the museum because, it would be helpful to have it all right there. Sometimes the maps you just carry around can get confusing. It would be good to have all the information right in one place.
Interviewer: OK, and was there anything that you think didn’t work so well or anything that you remember you didn’t think made sense?
Subject: Um, yeah, I can’t remember, yeah the little heart. I still don’t know why I would do that.

Interviewer: OK. Anything else?
Subject: That’s it.

Interviewer: And is this something that you could see yourself using in a museum?
Subject: Oh yeah, for sure.

Interviewer: And is there anything else that you’d like to add?
Subject: No, I don’t think so.

Interviewer: OK, I am going to stop the video.

Transcript: Paper Prototyping Session - Subject #5

Interviewer: Before we look at the design, I have to ask you just a few quick questions. First of all what’s your occupation?
Subject: Actually right now I am doing a temp job at a hospital down in the Evansville area. I am also finishing a project to graduate with my master’s degree, so I am technically still a student.

Interviewer: And do you have a smartphone such as an iPhone or Android
Subject: Yeah, I have an iPhone 5

Interviewer: OK, and roughly how many apps would you say that you’ve downloaded to your device since you’ve had it?
Subject: A lot. I would say maybe … let’s just say 100.

Interviewer: OK, and how do you use those apps? So in a typical day for instance what kind of apps do you use and what do you use them for?
Subject: OK, um, a lot of them like a lot of people I don’t use them everyday. It’s there, to have it just in case. I probably daily, I would say, maybe daily I use around 15 or so. Maybe 20. Just depending. I check my CNN app a lot. Or just maybe try to do that daily. You know, my mail, my phone, my text app. My clock. The typical usability ones. And then I have like one or two game apps that I use every day. So I do a lot of, you know, typical like, utility type things everyday. With a little for recreation.

Interviewer: OK, and have you ever used an app that was specific to a museum?
Subject: Let me think. Um, I don’t think I have yet. I do like going to museums. You know, if I have I might have just forgotten about it. Because I’ve been to like the COSI Museum and a lot of the ones in Indianapolis. But I do, when I go to certain places, not necessarily museums because I can’t remember, I’ve gone to like different places like airports and I’ll like right then and there download an app to help me with something. An example is the transit system in California. I downloaded it because I was there.

Interviewer: And how often would you say that you visit museums?
Subject: Um, maybe like one to two times a year? I never get to go out there, but when I do.

Interviewer: So, we are done with those questions and we can start looking at the designs. So, this is the first screen that you would see when you first open the app, then that would change to this and I am just going to start by asking you to look at the page and tell me what you think is going on on it.
Subject: OK, well there’s a nice welcome screen, and it’s big enough that you can see it. And you can see the general look of the building. That’s kind of nice so you know where you are. Um, and then it’s kind of like on the iPhone where you have your menu bar on the bottom, kind of like your dock. So that’s really nice. Because that’s always easy for shorthand. Then I see that based on this (points to dots) there are three pages. Or, actually, maybe three pictures scrolling across. So I can’t tell necessarily if it’s three pictures scrolling across or three pages. But it’s probably the pictures because I can see the arrows as well and that tells me I can click on these and not scroll, necessarily. Then I see the logo at the top, that’s nice. Then obviously there’s Facebook, Twitter and I am assuming Instagram.

Interviewer: Yeah. In fact, while we are here, what do you think the other ones are?
Subject: Exhibits, the calendar of events probably because it’s a museum. Then bookmarks, so maybe specific pages on the app that you want to bookmark, that’s where you can access them. And then just maybe Info, I am assuming info of like how to navigate the site or maybe info of the general information of the site or the app and location.

Interviewer: OK, and what would you click on first?
Subject: I would probably click on, knowing me, I think I would probably click on bookmarks would probably be the least. Like, the least possibility I would click on. The other three are probably even. Just depending on, if I don’t know what the museum’s about then I would click on about. But, first I would maybe click on like exhibits, especially since that’s the first one.

Interviewer: OK, now I am going to show you where you would go if you did click the exhibits button. And again, I am just going to ask you to look at the page and tell me what you think it is.
Subject: Just tell you about what I see?

Interviewer: Mhm. Yeah, what you think is happening here.
Subject: OK. I like that there’s a back button on the top so you can sort of know immediately that you can go back. And that’s something that drives me nuts, because there are few apps out there that don’t have a back button. And I am like, ‘I don’t know how to get back!’ Um, so I like that there’s the, what’s the word? The different, filters, that’s the word I was looking for, up here. I don’t know what location necessarily means, but then again I don’t know much about this museum. So maybe there’s different buildings. I also see there’s three and I can clearly see there’s arrows I can click on to find out more about it. I kind of like the pictures next to it because then visually you kind of have a feel of what it’s about. Or just something visual to connect to the words. And then you have your basic menu bar at the bottom.

Interviewer: OK, and what would you click on first on this page?
Subject: Well actually I just saw this while you were saying this, that this has most popular, so that’s definitely kind of a tempter for people to click on. If it’s the most popular, then it might be worth checking out.

Interviewer: OK. I made that most popular on purpose so on the next page I can show you where you would go if you did click on that most popular one. And this is where you would go. And once again, I am just going to ask you to look at the page and tell me what you think it is.
Subject: OK, it kind of is like the last page, but it has a header so you know which exhibit you are at. Then you have your typical menu bar, all this stuff is here and the same. And obviously now you kind of have those indicators, you know, most popular, second most popular. I have to say, I have never really seen Second Most Popular, so that is kind of interesting. So yeah, that’s kind of what I see. And again, I like the pictures. It’s kind of nice to have the visual.

Interviewer: OK, and what do you think you would click on first on this page?
Subject: To be honest, I think kind of the Types of Slavery, because I feel like with the subject of slavery, you probably kind of can tell what it’s going to be about. Especially with the title, Invisible: Slavery Today. I can tell that obviously there probably is still, there is still slavery today. And a lot of it is not seen by people. So I can kind of assume that is what this exhibit is about. So I would probably click on Types of Slavery so I would know, oh, what do they mean by types of slavery. Because some people don’t think there’s different types.

Interviewer: OK, excellent. And once again I am just going to have you imagine that you’ve clicked on Slavery’s Reach, that’s where we are going. I am to show you that page and ask you to tell me what you think it is.
Subject: OK, alright, based on Slavery’s Reach, the title, I am assuming it’s telling us about where the most slavery, where most slavery happens, things like that. Now, I see that there’s a play button so I am assuming there is video. And then you have the transcript which is nice actually because if you don’t feel like watching the video, you want to skim it instead, that’s nice. Then I like the caption because this is like a little summary about the video. Um, then, oh, OK. So I am guessing that if you are in the Slavery’s Reach area now, then that kind of tells you where to go. That’s nice. Then I see that there are several options. And it looks like I can scroll more. And basic doc bar at the bottom. That’s kind of nice that it’s consistent throughout. That’s really nice. And I can see the bookmark thing up here. Is it OK if I look back?
Interviewer: Mhm.
Subject: So then I am assuming that’s the share button and it will let me share on Facebook, Twitter, Instagram. So, I see there’s a bookmark but I also see there’s a heart. I often feel like, they’re not the same thing, but I am wondering, I know that there’s the bookmark here (points to bookmark on bottom). I can connect that. But there’s the heart here. If that’s the favorite, that’s what I think I would say. It’s the favorite. But maybe you see that on pages you’ve done before? I am not sure. And, often times other apps have favorites with a heart, but I am just referring to apps I’ve seen.

Interviewer: But that’s, OK, everyone does that.
Subject: Yeah. But I mean, I like it. I guess I would have to know beforehand what does that do? These are kind of obvious (points to list of content).

Interviewer: Let’s go ahead and go to some of these. What do you think Join the Conversation is going to show you?
Subject: I think it’s going to show me some way of communicating with people that might be at the museum. Which is cool, unless you have creepers. Or maybe things people have said in the past? So tips, almost like a FourSquare added feel. The poll is kind of fun, I kind of like doing polls. Obviously it could help the museum be better. The data, I am assuming, that one I am a little unsure about. Probably just because me, myself, I am trying to think of what kind of data do they have? Probably more facts about like, the effects of slavery. And then just news of maybe what’s going on now in the world? That would be kind of cool, because it’s showing that the museum is looking outside of itself, keeping updated. And then International Labor Union, probably just in connection with them and making sure it’s not happening, forced slavery.

Interviewer: OK. I am going to go ahead and take you to some of these places. Which one would you like to visit first?
Subject: Data.

Interviewer: OK, that’s where you would go. And then once again if you can kind of look at the page and let me know what you think is happening on it.
Subject: OK. Well, on top that’s really nice, the Main Menu.

Interviewer: What do you think happens when you select Main Menu?
Subject: Yeah. Um, I think it would probably go to well, I am assuming, main, I don’t know. Maybe here (homepage). That would make sense to me I think. I am only going off the name of it. If I were to click on it, I would probably... well, I know that Back probably takes me to here (points to Slavery’s Reach page). Because that’s just the previous page. I would probably like it to go like, one of these two places, I am not sure (points to Exhibits page and Exhibits Object list page). I kind of would be OK with either. They’re kind of close together so it’s not like it’s a big deal. You know? Because you can always go back.
Interviewer: OK, I am going to show you what it actually does. It makes this. But that’s not what you expected?
Interviewer: Oh, OK. No, I didn’t but that is handy. So, I am trying to think of another title that would help.

Interviewer: Me too!
Subject: Um, I mean the closest thing I can think of is, it’s not elegant, but drop down?
Something like that?

Interviewer: I thought about maybe object or item menu?
Subject: Or Page menu?

Interviewer: I am probably going to have to test that again.
Subject: Yeah. Drop down or page menu.

Interviewer: OK, well, let me get that out of your way. And in fact, let’s go back to here and where else would you like to go in here?
Subject: Let’s go to, I kind of want to before we go on to the next ones, Poll and then News maybe.

Interviewer: OK. This is where you would go if you clicked on Polls. And is this what you expected?
Subject: Yeah, that’s probably what I expected actually. Um, I like this typeface, what is it?

Interviewer: It’s Futura.
Subject: I didn’t expect it to be Futura.

Interviewer: I use it on all my wireframes.
Subject: I definitely, this is what I expected. Obviously it’s a test so I don’t expect a deep question. But I think in the future when they have a question, it would be different than this. That’s not against the design. I like that there’s see results.

Interviewer: OK, if you wanted to participate in the poll, what would you do?
Subject: I would say, um, well, see I saw that before this. So then I would say that I would strongly agree. If I didn’t see it before that (video page) you know, I would say of course it’s important. But personally I know there’s slavery. But is it one of the biggest problems in the world? I don’t know yet if I would agree. Does that make sense?

Interviewer: It does. And what do you think would happen when you press the vote button?
Subject: Um, it would probably actually, I am thinking it would show the results here maybe (points to the space between the question and bottom icons)? Or maybe a new page? Because I am guess if you didn’t really want to vote, you just wanted to see it you would go here (points to See Results button).

Interviewer: Now let’s head back and you wanted to see News next?
Subject: Yes, I am just curious. This is cool. I like this. It’s kind of cool that you did the bookmarks here. I think it’s laid out pretty well. I like that it shows the sources, so you’re not going, ‘well, where are you getting this information?’ Because some people just read subjects. They just read headlines because they think, ‘well, I got the gist, right then and there.’ Um, so yeah, I like this. And I like that there’s different sources and that it’s up-to-date. I don’t expect it to be everyday because it’s a museum not a news site. But it’s nice that it updates. The only question I have is if it bookmarks and obviously would go in here (points to bookmark icon on bottom), are they keeping all my news from the past? Will they always keep that one there? That’s the question.

Interviewer: That’s a great question. And honestly I don’t have an answer yet.
Subject: No, I like that idea. But then it’s like, I like the bookmark idea. But it’s like, do they want to keep news from 2005?

Interviewer: That’s a really good point. And let’s head back. Where else? I think we just have...
Subject: We have these two. Let’s do Join the Conversation.

Interviewer: OK, and once again I am just going to ask you to look at the page and tell me what you think is happening?
Subject: Um, well I think, obviously it looks a little like Twitter. It looks a lot like Twitter. So maybe this is a Twitter page, or Twitter feed. But also it could just be within the museum. I am assuming it would likely keep it within the museum because you are at the museum. Other people on Twitter who haven’t visited it, there’s no point for them to be on it. So, yeah. I don’t know what this is (question). I don’t know if there would be multiple questions or if that would be too much. Then there’s this (points to Join the Conversation button on bottom), so I don’t know, is it, maybe leading me somewhere where there’s more questions? Or maybe it’s just the title. But then there’s also this icon (points to Twitter draft icon), so I don’t know. Does it make another question? Does that make sense?

Interviewer: Yes it does. Is there anything else on this page you wanted to talk about?
Subject: I don’t think so. I mean it’s probably going to scroll. I don’t know how you have the design, but it would be kind of cool if the title just stays static while you scroll down.

Interviewer: Yeah, so you can still read the question?
Subject: Because people have such short-term memories.
Interviewer: Yep.
Subject: You scroll all the way down and forget the question.

Interviewer: OK, I am going to take Join the Conversation off your hands. Um, OK, so let’s pretend that you were in the museum and you were using the app in an exhibit but then you just started kind of wandering around and looking at things and you saw this structure. It’s actually an old slave pen. Let’s imagine you are sort of wandering through and you saw this structure and it drew your attention and you wanted to learn more. How would you do that?
Subject: Yeah. Um, well if I had already been using this app, I would definitely go, ‘Oh, is there something about this?’ But obviously it’s hard to expect an app to have just a wealth of information. You are already in the museum, you shouldn’t go to your app for everything. But, you know, I see there’s someone talking. So I would first maybe listen and see if he’s talking about it. And if he’s like answering questions and stuff. And then I see that certain places always have a display next to them. And granted you know, one of the oldest ways you could do it. But it’s good because if all else fails you have that. And it’s always there. And you can track something down to check your app. So those are probably the ways I would get information on it. And then I would maybe um, I would definitely check out the app. Because I wouldn’t expect it to have every single thing, I shouldn’t. But I would maybe go back and see, you know, exhibits especially. Granted, this may not be in the exhibits, it may just be part of the museum. So now I am going to, you brought this up, could there be something on the main menu, I mean in exhibits about long-term exhibits. I can’t think of the term.

Interviewer: Like permanent collections?
Subject: Yeah, permanent collections is a better word for it. So maybe something like that and that would be kind of cool because you don’t have to, it’s a different category, so that helps you to compartmentalize. And then in that category you could have just simple information about it. That way you don’t have to like, load the app every time. So, like questions that come to mind would be like, is this a real one? How did they get it in there? Can we go in?

Interviewer: Actually yes, it is real, they had someone, a professional woodworker, take it down and rebuild it in their building and you can go in it. If you are ever in Cincinnati you should go see it.
Subject: I am just going to grab my water.

Interviewer: We are very close to done.
Subject: It’s kind of fun actually. I don’t know if other people thought that.

Interviewer: You have many of the pages in front of you. Feel free to flip through them. How do you think you could find a map of the museum?
Subject: OK, let’s see here. I would probably first go back to home. Um, you know, then when I am at home I would think maybe I would go to About?
Interviewer: I am going to take you there.
Subject: A map, there you go. That’s nice that it has how to use your guide. So the About is the I. That’s nice. I didn’t think that immediately, because sometimes you see the I next to pictures, captions, so it’s kind of vague and general. That’s not necessarily bad. Once I go to About I see what’s on it. I like that. This is nice. And when you go to a museum it is a big deal to me to know how much it costs, if it costs anything. So, um, and I like the hours, that’s the other thing. Those are big things for me. Yeah, just kind of about the place. It doesn’t matter, but I guess I would automatically assume that About would be higher up. It’s such a little thing that I don’t really care. So, but um, if this helps, if I didn’t go to Home then About I probably would click on this (points to I icon).

Interviewer: OK.
Subject: So, if that helps. Now that I see that I feel like I should tell you that, Because obviously if I click on this, it would take me here (About).

Interviewer: Are there any other areas of the app that drew your interest?
Subject: Um, I hope I don’t delay this longer but I like apps, and so this is kind of fun. Maybe the calendar of events.

Interviewer: OK, I’ll take you there. There you go. And again I am just going to ask you to look at it and tell me what you think it is?
Subject: I am guessing these are arrows (points to drawn in arrows).

Interviewer: Yeah, they are supposed to be these (points to arrow icons on another page).
Subject: Oh, that’s fine, I just want to make sure. Yeah, I think this is nice. Um, see, it’s always, I am always debating with myself on something. Do you show the past events? I don’t know if you were expecting that. Because part of me is like, well, it’s already passed. So you don’t want people to think that you are lazy. Well, not lazy, but that you haven’t updated it. At the same time, it’s kind of good to know what they had in the past. Maybe you could put something like past events on here. That’s kind of what’s the best solution in my head. Granted, you know, do you really want to put that when you are trying to make the app simple. Does that make sense?

Interviewer: Yeah, that’s definitely something I can put together and try out.
Subject: Yeah, those are just questions I have for myself. Like, I sometimes have to remind myself that you can’t expect everything to be on here. Because it’s an app, it’s not a website.

Interviewer: Or can you?
Subject: Or can you? I find myself that if not enough information is on the app, I go to the site. Obviously that’s an extra step and you are trying to cut that. But again, you’re dealing with so many different people. I say it wouldn’t hurt to do past events, but like, up to a month. That’s what I would do maybe.
Interviewer: OK, let’s say you were on this page and the Stephen Marc event draws your attention. How do you get to more information about it?
Subject: Just click on this one (points to Marc listing arrow).

Interviewer: Mhm. That goes here. Again, is that what you expected?
Subject: Yeah, I think I expected because there are pictures on other parts of this maybe a small picture? And then, I like it when there are spaces between the paragraphs. I see that this is the date of the exhibit, I mean event, which is nice. Then I see that I can definitely skim, it’s nice to know that that’s just the summation. I like that it starts off with the cost, like as far as this paragraph it doesn’t start with a word it starts with a dollar sign because that kind of catches your attention. Um, and then, yeah, I mean.

Interviewer: Well, let me ask you this. What do you think these icons are up in the corner?
Subject: Oh, kind of like the other ones, where you can mark this as a bookmark, or like share this because you can go, ‘Oh, this is something that so-and-so might be interested in. Or I want to make sure that people go to this,’ then you can share it or whatever. My question for the bookmark kind of goes along with the news. Kind of, how long would you keep that up? Because again it’s nice to have a bookmark but then you wonder how long it’s going to last. Which is not a good deal either. How long are you going to reference these things?

Interviewer: Since we are talking about bookmarks, if you clicked on the bookmarks icon at the bottom of the page, what do you think would happen?
Subject: I would assume that it would kind of like the other (points to news), the way it’s listed, I would probably assume it would show something like this. Maybe some of the items would have a picture with it kind of like the exhibits have.

Interviewer: I’ll take you there an answer your question. Can you once again just look at the page and tell me what you think is happening on it?
Subject: Um yeah, I think that it’s, I like that there’s this (filter buttons) because you would have so many of them you would want to filter it. And, I like that it shows the category, before it, because if you just see ‘Slavery is one of the biggest...’ what is that? People have short-term memories so they favor it one hour ago and don’t know what it is. So I like that. The Slave Pen I am assuming is from, that you can kind of assume goes to that. I don’t know if you want to put a heading before that. I don’t think it’s necessary but it could be helpful for other people. There’s a back button so I am assuming you can just go back to what it was. I don’t know if you want to put little icons on top like the main menu would be kind of nice anywhere where you don’t have it.

Interviewer: OK, so that’s everything. We are done looking at the app design and I just have a few questions left.
Subject: OK.
Interviewer: First of all, what are your overall impressions of this app?
Subject: I like it. And I would expect this from you, I like the consistency of the design. That’s really nice. I think that’s one semi-big thing for me. It drives me nuts when app pages look different as far as colors, not necessarily colors but maybe fonts, stuff like that. If you have a specific color palette I can tell that. But if it’s different things on each page, I am like ‘what?’ So I like the consistency, and it’s sleek. And it’s not overloaded but then again it’s not so simple that you are like, ‘Why do I even have this?’ Because some apps are so simple you are thinking there’s no point to go on this, because there’s nothing here. So I like the consistency. Now, for me, I just like, I don’t like to deal with a lot of modifications. I just thought of this. But I don’t know if for some people if they’re like, ‘Oh, I want to change this dock (points to icons on bottom),’ you know, take things out. Some people like that. I like it with some apps but when it’s an app that belongs to a certain organization things like that I usually just don’t care and follow what they do. But if it’s like a personal, um, utility app or productivity app then I prefer to do my own way. Does that make sense?

Interviewer: Absolutely.
Subject: But overall I like it, I like it a lot. So it’s simple and I can use it, it’s fairly intuitive.

Interviewer: OK, and was there anything that you think didn’t work or anything you remember not making sense?
Subject: Well a lot of it I mentioned. They’re just small things, I mean, I am trying to think of the one thing I was thinking of before. Maybe the Main Menu thing but we’ve already talked about that. Overall big things? I mean, it’s also trial and error. I try to be forgiving of things. I thought the Main Menu might go here or here or here and then I click on it and that drops down. And I know, ‘oh, it does that.’ And from then on, I know that it does that. So does that make sense?

Interviewer: Yes.
Subject: So it’s something but it’s not a big deal. You figure it out. People do things differently somehow.

Interviewer: OK, just two more questions. Is this something that you could see yourself using in a museum?
Subject: Yeah. Yeah. I think, sometimes I forget that there’s things like this in museums. Especially children’s museums, I am just like ‘weee’ and I like playing with the things and dragging the things, and I don’t think about it that way. But maybe. Maybe like for a historical or things like the Indiana State Museum. I can’t remember if it’s the State or the Children’s Museum showing the three children who had a lot of power?

Interviewer: It’s the Children’s Museum.
Subject: Do they always have that?

Interviewer: Yeah.
Subject: That’s one of the ones I remember the most. Probably because of the way they did it. That was really cool. So yeah, if it’s like any kind of historical area I probably would use this more. It’s a lot of like wandering and seeing and things like that. I don’t know if that answers your questions.

Interviewer: No, it does.
Subject: Especially now that I go through this, I think, ‘Oh yeah, I can download these.’ I do that at a lot of different places, especially like transportation. I go like, ‘I can download the app.’ Or like store apps. I go like, ‘I am so lazy I am going to go download the app for Target’ or something I like.

Interviewer: Is there anything else you’d like to add?
Subject: Um, I don’t think so. I think this was really fun.

Interviewer: OK, I am going to stop the video.
Subject: OK.
APPENDIX 3

DIGITAL PROTOTYPE INSTRUMENT

SCRIPT TO BE READ TO PARTICIPANTS

Thank you for participating in this study. I am testing a new smartphone app I am working on so I can see what it’s like for actual people to use it.

I want to make it clear right away that I am testing the app and not you. You don’t need to worry about making any mistakes.

As we go along, I’m going to ask you several questions about your reactions to the design you see in front of you. I will also ask you how you might complete a few tasks with the app.

I want to hear exactly what you think, so please don’t worry that you’re going to hurt my feelings. I want to improve the app design, so it’s imperative that I know what you honestly think.

You may ask questions at any time.

I’m going to ask you to read and sign a consent form saying that I have your permission to audio record you, but that the recording will only be heard by the people working on this project.

Do you have any questions before we begin?

QUESTIONS FOR PARTICIPANTS

Do you have a smartphone such as an iPhone or an Android device?

Roughly how many apps would you say you have downloaded to your device, if you have one?

How do you use those apps? In a typical day, for instance, what kind of apps do you use and what do you use them for?

How often would you say you visit museums?

Have you ever used an app on your mobile phone while visiting a museum?

OK, we are done with the questions, and we can start looking at the design.

You have just arrived at the museum and want to check out their current exhibits. Use the app to do so.

What exhibit would you want to see, and why?

Now you want to know if there are any events going on today. Find out if there are any events at the museum today.
Now you are curious about when the museum is closing today. Find out when the museum closes.

You have seen the exhibits that are open today, and decided to head to the Wicked Bugs exhibit. Use the app to get to the exhibit.

Now that you’ve arrived at the exhibit, where would you like to start?

Use the app to find more information about the first item in the exhibit that you want to see.

Use the app to find another object in the exhibit that interests you.

Go to the beginning of the exhibit. Use the app to learn more about the first object in the exhibit.

Use the app to participate in the discussion about pesticides.

Use the app to learn more about the first few bugs in the exhibit.

When you get to the Centipede, bookmark and recommend this object.

When you get to the Brown Recluse, contribute your story.

When you get to the Mosquito, take part in the poll.

Find another bug in the exhibit similar to the deer tick.

Are there any other areas of this app that drew your interest? How would you get to them?

You are now free to explore the exhibit using the app. As you explore the exhibit, explain how you might use the app while you explore.

We are now done looking at the app design, and have just a few questions left.

Overall, what were your impressions of this app?

Is this something that you can see yourself using in a museum?

Is there anything else you’d like to add?

I will now give you a paper survey.

ENDING
Thank you for your participation in this study. Your feedback will help me to improve this design in the future. If you have any further questions about this app or about the research study, I would be happy to answer them.

Thank you for your time, we are now done.
APPENDIX 4

DIGITAL PROTOTYPE SURVEY INSTRUMENT

USABILITY SURVEY

General
1. I thought the app was easy to use.
Strongly Disagree  Disagree  Neither disagree nor agree  Agree  Strongly Agree

2. The app has a very attractive presentation.
Strongly Disagree  Disagree  Neither disagree nor agree  Agree  Strongly Agree

3. The app is interesting and engaging.
Strongly Disagree  Disagree  Neither disagree nor agree  Agree  Strongly Agree

Content
4. The content on the app is written in clear and simple language.
Strongly Disagree  Disagree  Neither disagree nor agree  Agree  Strongly Agree

5. The content is easy to understand and follow.
Strongly Disagree  Disagree  Neither disagree nor agree  Agree  Strongly Agree

6. The content is of high quality.
Strongly Disagree  Disagree  Neither disagree nor agree  Agree  Strongly Agree

Navigation
7. I found what I was looking for quickly and easily.
Strongly Disagree  Disagree  Neither disagree nor agree  Agree  Strongly Agree

8. I found the app unnecessarily complex.
9. The app didn’t always do what I expected it to do.

10. I did not know how to find what I was looking for.

11. The organization of the menus seems rational.

12. I felt that I had to click too many times to complete typical tasks in the app.

13. Using the app is frustrating.

Other Questions:

1. Please check the two features you liked best, and then explain why:
   - Events
   - Bookmarks
   - About section
   - Exhibits listings
   - Wikipedia content
   - Polls
   - Infographics
   - News
   - Discussion forums
   - Nearby objects lists
   - Similar objects lists
   - Recommendations

2. Please check the two features you liked least, and then explain why:
3. Overall, what were your impressions of this app?

4. Is this something that you would be interested in using in a museum?

5. Please list the most positive aspects of your experience with the app.

6. Please list the most negative aspects of your experience with the app.

7. Please mark an X where you think your experience fell on the following spectrums:

7a. The app helped me figure out where to go

Not at all ____________________________________________________________ A lot

7b. The app helped me to find things in the museum of interest to me

Not at all ____________________________________________________________ A lot

7c. The app helped me to understand the exhibit better
7d. The app was personalized just for me

Not at all

A lot

7e. The app helped me to do and see the things I wanted

Not at all

A lot

7f. The app helped me find information that was useful to me

Not at all

A lot

7g. I would want to use the app again

Strongly disagree

Strongly Agree

7h. If I bookmarked anything, I would look at it later

Strongly disagree

Strongly Agree

7i. The app helped me learn

Not at all

A lot

7j. I would participate in the discussions on the app

Not at all

A lot
FIELD TEST: TRANSCRIPT FOR SUBJECT #1

60 years old
Housewife
Has an Android

Researcher: Where would you go to find out what the exhibits are?
Subject: I'd go to exhibits. And then we have Adventure Bags, Green Roof Garden, Rose Garden and Wicked Bugs.

Researcher: OK, excellent.
Subject: I can choose popular, closest or category.

Researcher: OK, let's go to Wicked Bugs.

Researcher: Now you want to know if there are any events going on. How would you do that?
Subject: Any events?

Researcher: Any events going on at the museum.
Subject: I would have to go back. There was an events at the beginning. Yeah, there's events. And then there's the dates and what the events are and if I want to go back to the exhibit I can go there (bottom bar) and go to exhibits.

Researcher: OK, today you've decided to go to Wicked Bugs. Use the app to find out where that is.
Subject: OK, there's calendar, there is, that is so … probably go back. And then this and there's the map (About page).

Researcher: So we're in the exhibit. Now that we've arrived, where would you normally want to start?
Subject: I'd start here and go all the way around.

Researcher: OK, so from the middle and then where?
Subject: I'd start here when you first come in and then go around and come back to these. Then I'd go next door, so I'd have to see where the doors are.

Researcher: The portion of the exhibit we are going to be looking at is actually on the wall. And it starts over here.
Subject: It does? There's no signage over there. But I guess if I look in my app, the first thing is Bugs and People so I guess that's right.
Researcher: Now we are at the start of the exhibit. Use the app to find more information about the first item in the exhibit.
Subject: Which is Bugs and People. Discuss living with bugs, data about bug populations, news about pesticides, nearby and similar. That's pretty cool. I want information about bugs? I would pick data because that would be interesting. And there's numbers. That's interesting, 77 percent of insects is 77 percent of fish, mammal and reptile population. There's probably more. Let's go back to discuss living with bugs.

Researcher: Actually, now that you are here when this pops up, there we go
Subject: Oh cool.

Researcher: What's happening here?
Subject: [Reads question out loud from app]
Oh yeah, I think you're probably right. I would say that it's kind of a gray area because things like bed bugs don't get controlled without things like DDT and pesticides.

Researcher: If you wanted to add that perspective to the conversation would what you do?
Subject: I can tweet my answer. Or, let's see. I guess we could discuss it? Somehow I should be able to add my answer but I don't want to tweet it.

Researcher: In this app that's your only choice.
Subject: OK, I guess I'll tweet my answer.

Researcher: now I want you to use the app to learn more about the first few bugs in the exhibit, and I am not going to have any more questions for you until you get to the centipede. So we can just talk about what you're doing.
Subject: OK, go back to Wicked Bugs. (App stops responding). Maybe if I go back to exhibits?

Researcher: The whole app is frozen. Let me restart it for you.
Subject: Oh, they have, what do they call those? Where I can put my phone up there and get information.

Researcher: Oh, QR codes?
Subject: Yeah. Oh look, an etching. My dad used to do lithography. We used to have all these copper sheets just sitting in the garage. He used to use them for printing. Oh, there's a YouTube video. That's pretty cool. That's way cool. 40 people die each year from these things? (from exhibit sign) Is that like they have in Albania?

Researcher: Yeah.
Subject: Where are these? In Japan? Wow (Hornets, from sign). That's pretty cool. OK, kind of ugly. Let's click next and go to the centipede. Wikipedia, let's do the quiz. It's trying (app is loading slowly). The app crashed.

Researcher: Well, let's go back to that page and you tell me what you think it would do.
Subject: Here we go. It will ask you questions and you have to make an educated guess. Then it will tell you if your guess is right or wrong and it will tell you what the answer really is. And
sometimes you learn more by getting it wrong than by getting it right.

Researcher: And I saw you click these earlier, these are what?
Subject: I am guessing those are either the questions or the options a, b, c and d for your answers. That's how many people got 100.

Researcher: The question was, "How many legs does a centipede have, 100, 1000, 20-300 or 10-500."
Subject: Oh I see, I am guessing it's a pie chart of people's answers.

Researcher: And what answer do you think it is?
Subject: I would say a centipede, I would say 100.

Researcher: And you're wrong, 20-300.
Subject: You're kidding?
Researcher: No, and this right here explains that most people think 100.
Subject: Yeah because centa is 100. That's interesting. That's a good thing to know. And I see Wikipedia, I know what that is. I can go there and get information although it may not be right. And Nearby tells you what's nearby. That's pretty cool.

Researcher: Now that you are at the centipede, let's say you are very interested in the centipede. You think the centipede is one of the most interesting things you've seen today, and you want other people to know that you think it's interesting.
Subject: I could probably share it somewhere. Nearby, Similar. That's Home. That's a Calendar I believe. That is the Map. And Info. I see, How to Use This Guide, that's interesting. I know that on my phone if I tap the picture, it will send it to Facebook or whatever. I am guessing if I tap the picture I get the share on Facebook. And maybe it brings up a menu for how you want to share it. That would vary by what phone you have, too. I think. I am not sure, I only know how mine works.

Researcher: Let's wait on this page for a second, and let it load.
Subject: While we wait for that, I'll look at this. They have these in Florida.

Researcher: You can move on. We can just keep moving.
Subject: Oh, they have "Deadly." How cool. See, if I want to share it, I tap it. Maybe that's it.

Researcher: The icon in the right corner?
Subject: Yes.

Researcher: You're right. But it doesn't work right now.
Subject: I see Mosquito. Let me go back to the next one. Next is Mosquito. Oh, is the Deer Tick in [the app]?

Researcher: No, that's all I have in there. It's kind of unstable. I have 64 pages, I think that's part of the problem.
Subject: Yeah, so it's condensed to the first few.

Researcher: Yeah. Since we are pretty much done with those, find another bug in the exhibit, actually, one more question. Let's go back to the Mosquito. How can you find another bug in the exhibit that's like the Mosquito?
Subject: Well, similar. It should come up.

Researcher: In theory, yes.
Subject: And that would tell me a bug that's like the Mosquito but not the Mosquito.

Researcher: OK, and then let's go back to the Brown Recluse real quick.
Subject: OK, it's ugly.

Researcher: OK, here we go. These are the buttons we wanted earlier. Do you know what they are?
Subject: Recommend. Is that something I can share? Oh, now it says I recommended. I see. So in the beginning there were all these people who recommended things. If I liked it, I could recommend it. If I think it's kind of interesting. That's kind of cool. That's a good idea. To see how many people really liked it. So you could see only what's most popular. Cool. Got it.

Researcher: OK, let's go back, I wonder if we can get the Brown Recluse to come back up. OK, here's your list. You nailed it on the recommend part. Let's go to the Brown Recluse. I want you to contribute your story.
Subject: Let me hit Discuss: Share Your Story right there. So I can leave you ... apparently I can share my story that the neighbor that has two of these. Do you remember the neighbor that had two kids that lived right next to us? One of their kids was bitten by a Brown Recluse Spider. His skin got all crappy. And one guy up the street actually killed two of them. They're in a jar. They're common in this area. "Spider eggs hatched in the car while I was driving..." Ew! "My story is too terrible to tell." Haha. That's pretty good. That's pretty good. That is cute. That's a good idea. I love the stories, they're all interesting.

Researcher: Was there anything else in here you wanted to see?
Subject: Let me see. Let me go back. In terms of bugs or in terms of what it does?

Researcher: Either.
Subject: Oh, the Calendar. No, this was the Map. Here's Info. Here's how I would check to see what else it does. If I were using this on my own, this is where I would have started. Where it has How to Use This Guide. And here's all the info, that's a good idea.

Researcher: Hmm. And it scrolls.
Subject: Yeah, it scrolls and you can donate. It talks about the copyright. There's a map. There's How to Use This Guide. That's where I would start.

Researcher: Click here, on what you said is the Map.
Subject: Oh, that isn't the Map. What is that? Oh, it's just Bookmarks. Oh, I knew that. I looked at that before. So you can bookmark them and come back.
Researcher: How would you bookmark them and come back?
Subject: Well, let's see. Bookmark. I guess you press Bookmark and then you … It's not doing anything. Bookmarks: All, Popular, Closest, Category. I am guessing I can Bookmark it by going to it and pressing Bookmark.

Researcher: OK.
Subject: And then I would bookmark it. Popular would be what most people bookmarked. Closest would be closest. Category. I don't know what exactly that would be. I guess you divide them out by category – poisonous and not poisonous, whatever that would be.

Researcher: Is there anything else you want to see?
Subject: I would go through that stuff and then head into the exhibit.

Researcher: OK, one thing I noticed you didn't do was turn the photos.
Subject: I didn't do that. I didn't see that. Maybe an arrow would help, these all have arrows. Or something that tells you you can scroll.

Researcher: In the exhibit, I know they aren't loading right now, you're correct about the recommendations. But see this square up here? This is where you bookmark.
Subject: Oh, I see. I didn't see that. I see. So you can bookmark it by hitting the bookmark icon up there as well as the bottom. I probably would have figured that out after a while.

Researcher: Everything else…
Subject: I didn't know this moved. That was a shocker to me.

Researcher: Actually, there's another one (shows Menu).
Subject: Oh, awesome. Now that's cool. That's what that is. Oh, interesting.

Researcher: So, we're done looking at the app design. I have just a few questions. First of all, what are your overall impressions?
Subject: I think it would be great to have in a museum. I hate those talking sticks they give you. They're just stupid. And this way you can skip the things you aren't interested in and you can look further into the things you are interested in. And you can let other people know – because we all use social media anymore – what you thought was interesting. Yeah, it's pretty good. I like it. It sure beats the hell out of those talking stick things. And this way if you want to skip those, you just walk past and go to the next one. With those talking things, it's like, 'Number Six.'

Researcher: What do you think the app's weaknesses were?
Subject: I didn't know the pictures moved. I think something that would have cued me into that would have been helpful. I really probably should have read about the app before I did anything, that's what I normally do. I always say read the directions. So, I would have done that first, to have a little more information about what this was all about. I am big 'read the directions' person.

Researcher: OK.
Subject: But, that was me, not the app. It was there, I just moved on. That's good. The pictures
are great. I can't think of anything else.

Researcher: OK. So is this something you can see yourself using in a museum?
Subject: Absolutely. It is. I think it would make the whole experience better. So many times I've been in a museum and they have all of their wonderful displays and all of the info but there's something I didn't … I had a question that didn't get answered. Here, you can go to Wikipedia, which may or may not be right, and I liked the YouTube videos too. That was kind of cool. I would have liked to see the Hornets flying.

Researcher: I'll have to show you that video when it's working. It's really cool.
Subject: Yeah, it looked that way.

Researcher: Is there anything else you would like to add?
Subject: This was fun. It was cool. Of course, I like bugs so this was perfect.

Researcher: OK, I am going to stop the recorder.

FIELD TEST: TRANSCRIPT FOR SUBJECT #2

Researcher: So let's walk out here to the center. I want you to kind of imagine that you've just come to Minnetrista today. Have you guys been here before?
Subject: No.

Researcher: OK, so you've just gotten here and, um, you want.. actually let me ask you a few questions first. I almost went out of order. Do you have a mobile phone?
Subject: Yes.

Researcher: Is it a smart phone?
Subject: Yes.

Researcher: OK, and how many apps would you say you've downloaded to it.
Subject: Mmm… probably like 30.

Researcher: OK, and how do you use those apps? In a typical day, what do you use your phone for?
Subject: I use it for the calculator but I didn't have to download that one. I use it for social media, so I use Twitter, Instagram, Vine. I also use it for text messaging and calling. And, check email.

Researcher: OK. How often would you say you visit museums?
Subject: Never.

Researcher: OK. And so you probably haven't used a mobile app at a museum?
Subject: No.
Researcher: OK, that's all my questions. Just to go back, let's sort of imagine you've just arrived and you want to know what exhibits are going on today. How would you find out?
Subject: I would ask the front desk.

Researcher: OK. And then if you were using this, how would you find out?
Subject: Click on Exhibits.

Researcher: OK, you can go ahead and do that.
Subject: OK, I am clicking on Exhibits.

Researcher: It's OK, when you are clicking you can just what you are going to do then go ahead and do that. Because then I have a recording of that. This app is being a little bit slow.
Subject: I can see either all of the exhibits, or listed by popular or category.

Researcher: Mhm. And this is where I was saying it looks like it scrolls, but it doesn't actually. OK. So you know what exhibits there are today. Which would you want to see?
Subject: The Rose Garden.

Researcher: OK. And why did you pick that one?
Subject: Because of the picture. It's beautiful.

Researcher: OK. And if you wanted to know if there were any events today, what would you do?
Subject: I would go back to the homepage.

Researcher: OK.
Subject: And then click on Events. And then it gives me a list of the events.

Researcher: OK. Are there any happening today?
Subject: What's today?

Researcher: The 10th. See, that's helpful to me because now I know you weren't the only one to ask what day it is. So now I know I need to mark what today is. This is why we do the testing. OK. Now you know what events are happening, which there aren't any, and you are curious to know when the museum is closing. How would you find out?
Subject: I would go to the homepage and click on About. And then it tells me the exhibit hours.

Researcher: OK. I know you said you wanted to go to the Rose Garden, but today I have this set up for the Wicked Bugs exhibit. So let's imagine that you want to go to that one. How would you find out where it is?
Subject: I would look on the map. Here in About.

Researcher: Now, the Map is another one that doesn't work on the iPad. Let's go then to Wicked Bugs, which is upstairs on the second floor.
Subject: Oh wow! I didn't even know this place was a museum.

Researcher: Yeah, they have exhibits on the second floor and it's always different every couple of months. OK, you've just walked into the exhibit. What would you normally do when you walk in here?
Subject: Mmm… go around the wall.

Researcher: OK, and then what?
Subject: And then go to the middle.

Researcher: OK, excellent. We're actually going to start around the wall. Let's start over here. It's an exhibit called Wicked Bugs. This is where it gets kind of weird, because I have certain things that I'll need you to do. But just kind of take your time and do what you would normally do. So if this is where you would start my task for you is just to find more information about this first item. So you can read it first, you can look in the app, just whatever you think is going to give you the best information.
Subject: OK, it recommended Bugs and People so that's definitely where I would start.

Researcher: OK.
Subject: (She reads the Bugs and People sign then looks in the app). Now what?

Researcher: Just learn more. I am just curious if you would use this. And what you would click.
Subject: I would click on that (data). Seventy-seven percent are bugs? That's horrible. I would never have guessed that. That's horrible. I hate bugs. Except butterflies.

Researcher: Well this room is mostly butterflies so you can wash the terrible off by looking at them when you are done.
Subject: Oh look, Twitter. That's awesome. Can I just keep going?

Researcher: Sure, just keep going. I don't have any specific questions for you until you get to the Centipede, so you can just keep going.
Subject: The Hornet has been recommended a few times. What was [name] talking about?
Subject 2: Oh, Hornets. He saw five.
Subject: They resemble small birds? (From sign on wall). Oh, you can do a quiz? That's awesome.
Researcher: Oh yeah.
Subject: Was that my task?

Researcher: It was one of them, yes. I am just waiting to see what you do and if you don't do a task then I'll ask you to.
Subject: I think it's 100 legs, right?
Subject 2: Yeah, I think that's right.
Subject: Do I hit Vote?

Researcher: Yes, I probably should have renamed it 'Answer.'
Subject: Hm. That's very misleading. Not your work, the answer. You would never guess 20-300. Is there another question?

Researcher: Not that I put in here, but I like that you're interested in another question.
Subject: I don't think I've ever seen a Black Widow.

Researcher: So, I actually only made all the way up to Mosquito. Let's go back to the Centipede. Earlier you said the Hornet had been recommended a bunch, let's say you wanted to recommend the Centipede. What would you do?
Subject: I am going back to the exhibits.

Researcher: The list of all the bugs. This one you might have to give it a second.
Subject: And then I am going to the Giant Hornet. This?

Researcher: That's like, a Facebook share.
Subject: Um, I am not sure. I am sorry.

Researcher: No, that's OK. This is my bad, my problem. I showed this to someone who designs apps for a living and he said, 'You screwed up the recommendations.' You went back to the list and you looked for the Hornet. Part of the problem is the last thing you needed loaded last. So that's something that you shouldn't apologize at all for. OK, now let's say when you get to the Brown Recluse, and I know when you were at the Giant Hornet you talked about your friend who saw five of them – let's say you get the Brown Recluse object and you have a spider story. How could you share your story with other people?
Subject: (2 reaches toward iPad and selects Discussion).
Subject: Do you have a good spider story?
Subject: Not really.
Subject 2: I usually just kill them.
Researcher: You are probably the only people on the story with a good hornet story but not a spider story.
Subject: Yeah, we really don't have one. I have a lot of bee and wasp stories. 'In the dash of my car?' Ew. I did watch a horror story about spiders. It was like Bloody Mary, where a spider laid eggs in her face and they hatched.

Researcher: OK, let's go back to the spider. You said you usually kill spiders. You said you usually kill spiders. Can you take part in this Poll?
Subject 2: All right. I guess my answer depends. Unless it's a Daddy Longleg I just smash it. Thirty-three ignore it?
Subject: Catch it?
Subject 2: Like, catch it and put it outside.

Researcher: Let's say you also want to find something similar to the Brown Recluse Spider. How can you do that?
Subject: Similar?

Researcher: OK. Is there anything else in here that you were interested in that you wanted to take a look at?
Subject: With the Brown Recluse Spider?

Researcher: With anything. Just the whole time you've been using it if there was anything you saw.
Subject: This.

Researcher: The I at the bottom?
Subject: Oh, it's like about the app. You can donate? I am also clicking on the Bookmark tool.

Researcher: I didn't make the Bookmark thing work, but he was pointing to the bookmark thing earlier. If you bookmarked something, it would end up in there.
Subject: So all of these can be clicked on at the bottom I guess?

Researcher: Yes. Was there anything else you wanted to look at?
Subject: Um… I don't think so.

Researcher: And then Nearby, I didn't really like…
Subject: Nearby the exhibit?

Researcher: Yeah, I didn't really do this page for real because there's only seven bugs and it doesn't make sense to make seven nearby pages.
Subject: Yeah.

Researcher: OK, well I have just a few questions to ask. Overall, what were your impressions of the app?
Subject: I think it's really good. It think you did a good job. I mean, I never would have thought to do, it's a good idea. Because I guess people like to interact.

Researcher: Is this something you could see yourself using?
Subject: If I came to museums a lot.

Researcher: And, was there anything that you saw in there that you thought didn't work or that you wouldn't have used?
Subject: Mmm … actually everything is very, very helpful. Especially the Wikipedia. I didn't see it before but I see it now. I like that.

Researcher: Yeah, you can go to one real quick. I think all of the bugs have them.
Subject: Oh, a video transcript?

Researcher: Yeah, there's a video here, it's not popping up for some reason.
(She reads the transcript.)

Researcher: Oh, I know why the video isn't popping up. It's the iPad. I can show you what one looks like.
Subject: Oh, OK. Can I watch it?

Researcher: Sorry, not on the iPad. Is there anything else you'd like to add or that you think I should know about?
Subject: No. I think you did a good job.

Researcher: OK, I am going to give you the paper survey now and stop recording.

FIELD TEST: TRANSCRIPT FOR SUBJECT #3

Researcher: OK. So, um, real quick I just have a few questions. Do you have a smartphone such as an iPhone or Android device?
Subject: Yes.

Researcher: And how many apps would you say you have downloaded?
Subject: Um, 50?
Researcher: OK, how do you use those apps. So in a typical day, what kind of apps do you use and what do you use them for?
Subject: I just use the browser, and email.

Researcher: OK, how often would you say you visit museums?
Subject: Twice a year.

Researcher: And have you ever used an app on your mobile phone while visiting a museum?
Subject: No.

Researcher: OK, that's it. We can start looking at the design. What I want you to do is just kind of imagine that you are just here, and you want to see what's going on. So you've just arrived at the museum and you want to check out the current exhibits. I want you to find out what exhibits you can see today. And also, I forgot to tell you, I'd like you to use the Think Out Loud Method, so kind of narrate what you are doing.
Subject: Alright. I can do that.

Researcher: I don't have video so if you just tell me what you are clicking on that would be helpful.
Subject: OK. I am now clicking the exhibits button. Now I see a list of exhibits.

Researcher: You're doing good. Which one interests you?
Subject: Um, Bugs Outside the Box.

Researcher: How come?
Subject: Because there's a cool picture of a bug.

Researcher: OK. Now you want to know if there are any events going on today. Find out if there are any events going on at the museum today.
Subject: OK. I am now clicking on the calendar icon.

Researcher: OK. And?
Subject: And, it pulled down a list of dates. And, uh, I am assuming event names.

Researcher: Are there any events going on today?
Subject: Nope.

Researcher: OK, now you are curious about when the museum is closing. I want you to find out when the museum is closing today.
Subject: OK. I am now pressing the Information icon. Exhibit hours - 9 a.m. to 5:30 p.m. Monday through Saturday.

Researcher: OK. So you've seen the exhibits that are open today and you've decided that you want to see Wicked Bugs. I want you to find out where that is. How do you get to it?

Subject: How do I get to it?

Researcher: Mhm.

Subject: Um, I am clicking on the Wicked Bugs exhibit. I want to know where it is?

Researcher: Mhm.

Subject: I don't see it in here. I am clicking the information button. Map button?

Researcher: Mhm. I don't have the Map actually working in here. Let's just go up to that exhibit. Alright.

Researcher: OK, now that you've arrived at the exhibit, I want you to tell me what you would do when you walk in.

Subject: What to do when I walk in?

Researcher: Yeah, what you would do.

Subject: Well, I would look around, and see what kind of exhibits are in here. Um, then I might open up the app and look at the Wicked Bugs exhibit. And then, I look around at all the different exhibits and if I wanted to know more about one of the particular bugs I would see if I can find it in the app.

Researcher: You said you would look around and if you wanted to know more look in the app, but where would you look first?

Subject: Where would I look first?

Researcher: Mhm.

Subject: In this room?

Researcher: Mhm.

Subject: This.

Researcher: The case that's in front of you when you walk in?

Subject: Yeah.

Researcher: OK. And then what?
Subject: I don't know.

Researcher: Well let's imagine you want to look at this over here. This is the Wicked Bugs portion. Is there anything that draws your eye that you would look at first?
Subject: Anything that draws my eye that I would look at first? Um, nothing in particular. I would probably start at the beginning.

Researcher: OK. So let's start at the beginning then.
Subject: OK.

Researcher: Um, you can take a second to read it, but after you read it let's say you were curious for more information, how would you learn more?
Subject: The only way I could learn more would be if I could look at it on my cell phone right here. If I wanted to know more I could look in the book or scan these QR codes.

Researcher: What if you had to use the app to learn more?
Subject: Well, I could look on the About the Author part. I could watch this video.

Researcher: Watch a video? OK. Sounds good. Let's go back to the first one. Learn more about this in the app.
Subject: OK. This one, I could look up Bugs and People. And they've got pictures, discuss: living with bugs.

Researcher: If you wanted to discuss living with bugs what would you do?
Subject: Press the Discuss button. It takes me to … um … a Twitter feed. OK. Um, there's the Tweet Your Answer thing, so I can tweet my own answer if I wanted to.

Researcher: Excellent. If you want to just take a look at the exhibit I don't need you again until we get to the Centipede so just do whatever you'd like to do.
Subject: OK … I am at the Centipede.

Researcher: Alright, um, and is there anything on here that you think looks interesting?
Subject: Uh, Quiz. I am going to go with the Centipede Legs Quiz section. How many legs does a centipede have? 100. This brings up a chart.

Researcher: Of what?
Subject: Different people's answers I am assuming. And then it brings up some information: 'The answer might surprise you, a centipede has between 20 and 300 legs.'
Researcher: Now what if you were really digging the Centipede and you thought you might want to come back and look at it.
Subject: I think there's a section near Quiz, where I can go to Wikipedia. And it takes me to an article on the subject of the Giant Centipede. Yep, there it is.

Researcher: OK, what if you wanted to let other people know about it?
Subject: Um, if I wanted to let other people know about it then … you can click this button up here at the top and then it would take me to Facebook or Twitter and I could let people know.

Researcher: What if you wanted to bookmark it?
Subject: Bookmark it? Um … well, I would think there would be a bookmark button here (object page) but if I go back to the exhibits list and then wait then I assume I can click the bookmark button here.

Researcher: Yep. OK, where are you going next?
Subject: Anywhere?

Researcher: Yeah, where do you want to go?
Subject: This one.

Researcher: The next one over?
Subject: Yeah.

Researcher: The Brown Recluse Spider.
Subject: Brown Recluse Spider.

Researcher: It's begin slow, sorry.
Subject: OK.

Researcher: What if you wanted to share your story?
Subject: Share my story?

Researcher: Mhm.
Subject: Click this Share Your Story section. Then I can just Tweet.

Researcher: OK. And then what if you wanted to take part in the Poll?
Subject: I would go to Poll. 'What do you do when you find a spider in the house?' Catch it and let it out. Then vote. And then, there's a pie chart of people's answers. Most people want to kill it.

Researcher: How do you feel about that?
Subject: Bad.

Researcher: What if you thought the spider was cool and you wanted to see something else like it at the museum?
Subject: I would click back. Then I can say, Similar.

Researcher: OK, those are all the different questions I had. Were there any areas of the app that drew your interest?
Subject: That drew my interest?

Researcher: Yeah, that we didn't get the chance to look at?
Subject: News.

Researcher: For the Black Widow Spider (where he was clicking)?
Subject: Yeah. Looks like it brings back a feed of news. Oh, Black Widow news stories.

Researcher: Anything else?
Subject: Um, what did I click on before? This.

Researcher: What do you think that's going to do (similar button)?
Subject: Fill me in on other exhibits that are around here.

Researcher: Yeah. I didn't put all of these together but you are right. Alright, anything else?
Subject: No.

Researcher: Excellent. OK, we are done looking at the app design. Um, I have just a few questions left. Overall what were your impressions of the app?
Subject: Um, I thought it was pretty good. It looked good and seemed to make sense. Um, the only thing I would have changed was added a bookmark button to.. the uh..

Researcher: The objects?
Subject: Yeah, that way you don't have to go back. And maybe make this button the share button?

Researcher: It is the share button?
Subject: Oh, I didn't know it was the share button.

Researcher: Alright, and then um, what did you think didn't work. I guess the bookmark and share button. Anything else?
Subject: No.
Researcher: Is this something you can see yourself using in a museum?
Subject: Yes.

Researcher: How come?
Subject: Because it provides more information that you can get otherwise.

Researcher: OK, I am going to stop recording.

FIELD TEST: TRANSCRIPT FOR SUBJECT #4

Researcher: I have just a couple initial questions. Do you have your own smartphone?
Subject: Yes.

Researcher: Is it an iPhone?
Subject: Yes.

Researcher: And how many apps would you say you've downloaded do it?
Subject: A lot. I would say 15-20 I guess.

Researcher: How do you use those apps? So in a typical day, for instance, what kind of apps do you remember using?
Subject: Um, a lot of social media because I try to keep up with the news and what's going on. And Facebook to keep in touch with home since I am so far away. And then I use SnapChat all the time with friends and with my sister, who is a first grade teacher. She'll SnapChat me pictures all the time of her kids.

Researcher: And then how often would you say you visit museums?
Subject: Um, at least once or twice a year, because I am a nerd and I go when I can.

Researcher: OK. And have you ever used an app on your mobile phone while visiting a museum?
Subject: No.

Researcher: OK. Alright, we are done with those questions. We can start looking at the design. So, let's go ahead and imagine you've opened the app, you've just arrived at the museum and you want to know what exhibits are here today. How would you do that?
Subject: Well, um, on the home screen there's a list that says exhibits, bookmarks, about and map. I am assuming I should click on exhibits so I do. And a whole bunch of…
Researcher: I should mention now that the system I built this in doesn't let you scroll. So I made it to look like it scrolls because I think it should.
Subject: Yeah.

Researcher: But it just won't let me.
Subject: OK, that's fine. So there's a bunch of exhibits listed.

Researcher: Yep, that's it. What is it from this list that you would be interested in seeing?
Subject: Uh, I think the Rose Garden.

Researcher: How come?
Subject: The picture is pretty. It just draws my eye. I like this rose.

Researcher: OK, we are actually going to go to Wicked Bugs because that is the one that I have put together. But before we do that let's say you are kind of here at the end of the day and you want to know if there are any events going on still. How would you do that?
Subject: I would hit the back button. Or, no, there's a home button. I would hit the home button and then click on the events on the homepage. There's a huge list. There's nothing listed for today.

Researcher: OK, now you are curious when the museum is closing. How would you find out when they are closing?
Subject: Well, I'll go to home again. And then about maybe? Yes. There's exhibit hours, which today ends at 5:30.

Researcher: Let's say you've decided to go to Wicked Bugs. How would you use the app to figure out where that is?
Subject: OK. Well, if I go back to the home screen there's a little bar that says Map. So I click Map. What exhibit am I going to again?

Researcher: Wicked Bugs. Let's go there. So, you've just walked into the exhibit.
Subject: Yes.

Researcher: Normally, if you just got here, what would you do first?
Subject: Without the app or with the app?

Researcher: Either.
Subject: Well, I would probably first just look around at everything and the butterflies (right by the door) grab my attention. So I'd look at the butterflies and then just look around. I feel like
since I have the app if there's something I wanted to know I would just look on the app and see if there is something I can figure out more about.

Researcher: OK, that makes sense. We are going to actually look at just this exhibit in the back that says Wicked Bugs. Let's head over there. Is there anything here in this part that catches your attention that you want to look at?
Subject: Hm… About the Author because the book cover grabs my attention.

Researcher: OK, if you wanted to know more about this, what would you do?
Subject: It has one of those photos … or… a

Researcher: QR code?
Subject: Yeah, QR code. So I think I can take a picture of it, I don't know if you have to have a special app on your phone. Through the app, I think, I can find Wicked Bugs, then … Oh, I see. Now I can go in About the Author. It has videos and links about the author, which is Amy Stewart.

Researcher: Which of these would be helpful to you if you wanted to know more?
Subject: I like the video the best.

Researcher: You can actually play it.
Subject: Oh, OK. (video plays). Ew, the lice thing is making me itch all over.

Researcher: OK, excellent. Let's go to the beginning of the exhibit and I want you to use the app to learn more about the first object.
Subject: OK, let me go to the first part. It's loading. Do you want me to refresh?

Researcher: The refresh button doesn't work here.
Subject: OK, so I am at Bugs and People. And, there's an interesting picture. Am I supposed to do something?

Researcher: Well, if you were here and you wanted to know more, just do whatever you would normally do. You can read the sign, use the app, whatever.
Subject: Oh, bug populations looks interesting.

Researcher: So, data?
Subject: Yes. Oh, this app is freaking me out.

Researcher: While you are here, this sign talks about how the how the author thinks that we can do more harm by using pesticides to control bugs, and she ends the saying by that maybe the best
approach is learning to live with bugs. If you wanted to give your opinion on that and maybe agree or disagree with her, how would you do that?
Subject: It says Discuss: Living with Bugs. Maybe that part? Yes, that's definitely it. Because it takes us to … it looks like a Twitter feed. You can talk about your opinion on what's best to do with pesticides and bugs.

Researcher: OK, and if you wanted to give your opinion, what would you do?
Subject: It looks like there's a little button that says Tweet Your Answer. And you can Tweet your answer but I am not going to because I am not signed in.

Researcher: OK, now you can just use the app to learn more about the first few bugs in the exhibit and I don't need to bother you with questions again until you get to the centipede. So this is like free range time.

Researcher: Alright, so let's imagine you love this centipede, you think it's very interesting. You want to recommend it to other people here. How would you do that?
Subject: Um… it's the Giant Centipede right?

Researcher: Mhm.
Subject: So I click on Giant Centipede. Hm. I don't know.

Researcher: OK, sure. Which did you say was the bookmark?
Subject: This little square.

Researcher: Mhm.
Subject: And is this the internet?

Researcher: It's actually information.
Subject: Oh.

Researcher: So, now we are at the Brown Recluse Spider. And, let's imagine that there's a sign here and it says, "Tell us your worst spider story." How would you do that?
Subject: Is it supposed to be the Black Widow or is there a Brown … Oh, just kidding. I can't read. Here it is.

Researcher: Oh whoops, it's stuck. I'll have to restart it. I am not sure if it's the app or my phone, sorry.
Subject: Now I am at the spider, it has Discuss: Share your Story and a little tab thing. I'll push it. Yep, Twitter feed.
Researcher: Alrighty, and how would you contribute your story?
Subject: The little button that says Tweet Your Answer. So I would push that.

Researcher: OK, and again that's my Twitter. And then, now we've gotten to Mosquito. When you get to the Mosquito use the app to learn more about it.
Subject: OK, I am pressing the Mosquito. Data, and then it takes you to News. I'll bet it will take you to information about mosquito populations.

Researcher: What about mosquito populations?
Subject: On the news there's been stories about mosquitos and spraying, where mosquitos like nest and everything and how they're expecting there to be a higher population. I didn't see it all but I'll bet it's all here.

Researcher: OK, so let's say you want to … you know what, I am going to take you back to the centipede. And you want to take the quiz.
Subject: I press the Quiz button. That's kind of cool. How many legs does a centipede have? I would say, 100.

Researcher: What do you think the graph is showing?
Subject: The percentage, I guess the different types of centipedes with different amounts of legs? (the text answer did not show up on the app).

Researcher: OK, were there any other areas of the app that drew your interest?
Subject: Yes. I liked how now only can you learn more about the different exhibits, but there's like the events page, because I actually wanted to know about the Farmer's Market. And I knew Minnetrista had one, and I saw it on here.

Researcher: Yeah. Is that what you were going to go look at?
Subject: Yeah.

Researcher: What other areas do you remember seeing that you liked?
Subject: I just liked how descriptive everything is and how each app has all the different information for it.

Researcher: What were your overall impressions of the app?
Subject: I think it's good. I like it. I think it would be really, today's … age or whatever you want to call it uses technology everywhere. And this just helps you interact with it and I know that education is having trouble catching up. So I think this pushes it a little bit more forward. You can use apps like this to like, well, my sister is a first grade teacher and the school gave her an iPad. And so if they have this she can take this and have her kids use it and that would be really
neat. It would be better if they all had an iPad but that would be really neat. To have that. Especially with little kids who need to learn to use technology. That would be a way to introduce them to it.

Researcher: OK. And is this something that you think you would use at a museum?
Subject: es, definitely.

Researcher: What would you use the most, do you think?
Subject: Probably if there's something that I thought was really interesting like the centipede and I wanted to know more information about, I would go and explore it through the app.

Researcher: OK, and is there anything else that you want to add?
Subject: Um, no.

Researcher: OK, what did you think maybe didn't work in here or were things you wouldn't look at?
Subject: Mmm … I can't think of anything. Probably just exploring the whole app would help me find something.

Researcher: OK, are you ready to take the survey?
Subject: Yes.

FIELD TEST: TRANSCRIPT FOR SUBJECT #5

Researcher: I want you to kind of imagine you just got here and you aren't sure where to go. Have you ever been here before?
Subject: Yeah, once a while a go.

Researcher: OK, I want you to find out what exhibits there are today.
Subject: I am going to go to the exhibits tab. Aventure Bags, Garden, Wicked Bugs.

Researcher: OK, now I will tell you I have designed this so that it scrolls, but I made it in App Press which doesn't let you scroll.
Subject: OK.

Researcher: I made everything look like it scrolls but it actually doesn't.
Subject: OK.

Researcher: Fair warning.
Subject: OK, that's fine.
Researcher: Um, but you are right, normally you could scroll. OK, let's imagine you've decided to go to the Wicked Bugs exhibit. How would you know where to go?
Subject: I would just hit the arrow. Because I am assuming that it will take me. OK, so, it took me to the Wicked Bugs. Bugs and People, Giant Hornet. And so if I wanted to know more about the Asian Giant Hornet I am assuming I should click this. It's scary.

Researcher: OK, if you wanted to know where it is in the building, how would the app tell you? Subject: I don't know. I don't know how to get there from this screen. I should probably hit the home button. And go home. And then … map. Simple enough.

Researcher: OK, here again is another area where it's not clickable.
Subject: So then I would see like little dots and it would tell me what that is?

Researcher: Yeah. OK, if you wanted to know if there were any events going on today that you might be interested in, how would you do that?
Subject: I would go back home. And then go to events. But does the little menu thing work that's next to the home button? Because that's a place that I would go to too (the one that's on the physical phone not the digital interface). There's a list of what's happening everyday. Is that when the event starts? I don't know if that's when the event starts. June 15, Family Fun Day. I guess I can click on it. Alright, I am assuming that's a one-day only thing. I am assuming these are one-day events.

Researcher: OK, let's imagine now you want to see the Wicked Bugs exhibit. Let's go ahead and head up there. OK, here we are. What I'd like for you to do is to describe to me what you would normally do when you walk in here.
Subject: I would look at the butterfly thing right in front of me.

Researcher: OK. And then what?
Subject: And then go … start left, with Bugs and People. Go left to right.

Researcher: OK, let's go ahead and do that. From where you are standing, what would draw your attention?
Subject: I would go straight to the actual bug drawings.

Researcher: OK. Now that you are at the actual bug drawing, whichever one you would normally start with, use the app to learn more about it.
Subject: OK, well I think I would start with giant hornet. So I click on giant hornet and it takes me to the page. It's going to be an actual video of the hornet?
Subject: I've seen that video, it's ridiculous.

Researcher: So if you wanted to know more, what would you do here?
Subject: I would go to Wikipedia.

Researcher: OK, so, um, find another object that interests you. You've seen the hornet. What else interests you?
Subject: In the whole thing?

Researcher: Mhm.
Subject: Or just from like…

Researcher: Just whatever you would do.
Subject: I would just go from bug to bug around the little thing. And I would read from here more so than what's on my phone. So I would go from three, four to five, to six. I would just do that all the way around.

Researcher: OK, and so, let's go back to the first one and I'll have you imagine this one is where you would start and you would skip the two that are explanatory.
Subject: Honestly, I would.

Researcher: If you could find this object.
Subject: I go back from giant hornet. Bugs and People, that's the first one. I clicked on it.

Researcher: If you wanted to participate in the discussion what would you do?
Subject: I would hit Discuss: Living with Bugs. Oh, there we go. A comment board.

Researcher: Mhm.
Subject: It looks like Twitter.

Researcher: And how would you leave your comment?
Subject: Oh, I would hit the Tweet Your Answer. Want me to?

Researcher: Sure.
Subject: Hey, look at that, that was quick.

Researcher: OK, and then…
Subject: You would answer the question and just be like, this is my opinion.
Researcher: OK. And if you just wanted to look at everything I don't have any questions for you until you get to the centipede.
Subject: Um, I see buy the book. I can go to their website I guess.

Researcher: OK, let's say you really love the centipede. You think it's the coolest bug here and you want other people to know about the centipede. How can you do that?
Subject: Go to centipede.

Researcher: Mhm.
And then once I am at the centipede, I would … go to … back to the last screen. And I can
Subject: recommend it. It actually says recommend. I would hit recommend. You recommended it.

Researcher: What if you wanted to save the information about the centipede for later?
Subject: I would bet that's the bookmark.

Researcher: That's right. Let's head over to the brown recluse. And you want to learn more about the brown recluse. Let's say you have a brown recluse story or something and you want to share your story.
Subject: Hit Discuss: Share your story.

Researcher: What are you seeing here?
Subject: It's, oh, a circle of death.

Researcher: Oops, it crashed. Let me restart it. Let's go back to the centipede. And you want to participate in the poll.
Subject: The quiz?

Researcher: Yeah.
Subject: I hit the circle and hit vote. What? 20 to 300 legs? Why is it called the centipede? It should be called the 20 to 300-legs-ipede.

Researcher: We've established you love the centipede. If you want to find another bug like it, what would you do?
Subject: Similar.

Researcher: Alright, so there we go. That's about it. Where there any other areas of the app that drew your interest.

200
Subject: Anything that interests me? I am assuming these are quick links to the calendar. Yeah. And app info. Oh no, it's Minnetrista info. That's cool. And that's the home button. And bookmarks, is that my centipede?

Researcher: Yes. I didn't actually code this so today it won't be in there but the idea is Subject: you bookmarked it so it will be there. Gotcha. I'd like to have my own centipede. I love it so much.

Researcher: OK, now that we're done with the app I have some questions for you. Overall, what were your impressions of the app?
Subject: It's easy to use for a place as small as Minnetrista it seems a bit unnecessary. But if you were to expand to the British Museum, something like that you could really, really go pretty far with it. Especially with the recommend part of it. But it was easy to use. It was clean and there's not a lot of buttons. Mostly in the important parts there aren't a lot of buttons.

Researcher: OK. Was there anything that you thought didn't work very well?
Subject: The events in the calendar portion was semi-confusing. Only because I couldn't tell exactly if the event was longer that was starting, if it was a recurring event, hypothetically it could have said Wicked Bugs on here. But just clicking on it, I didn't know exactly what it meant.

Researcher: OK. And is this something you could see yourself using in a museum?
Subject: Yes, definitely.

Researcher: OK, and is there anything else you'd like to add?
Subject: No. It was really good, I liked it.

Researcher: OK, now I have a survey for you.