UNIFIED DESIGNS

Round 2 User Testing Analysis

Augmented Reality

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User Testing Round 2: AR Focus Group

Executive Summary

In round two of user testing, we focused on the augmented reality (AR) features within the National Museum of the American Indian (NMAI) prototype. Unified Designs created the prototype to enhance the visitor experience at NMAI by providing an additional depth of information not available in the museum itself and interactive, augmented reality experiences to entertain and inform visitors. A pre-survey was sent to potential focus group participants to ensure a homogenous group was chosen for this round of testing. A feature prioritization/exploratory focus group was created to find out which proposed AR features people perceive to be valuable, what motivates them to use AR applications, how they would expect to access an AR experience and their attitude towards these features. Kuniavsky (2003) defines a feature prioritization as ranking the importance and attractiveness of proposed features. An exploratory focus group looks at the general attitude and possibly reveals unknown issues. In an effort to discover answers to our goals, we introduced the participants to the concept of augmented reality. In particular, we demonstrated three applications of the technology:

- Image recognition in order to overlay information
- Interactive, 3-D models of objects
- The opportunity to relive an experience that happened in the same space you occupy but at a different time (event experience)

The results from the focus group provided some insights into the participants' perception of augmented reality. Participants were most impressed with the image recognition and 3D models of objects for the augmented reality features. They were also able to appreciate, from the examples presented, that AR "…might be complicated to implement but it's really simple to use."

Participant Profiles

A pre-survey (see Appendix A) was distributed to potential focus group participants in order to ensure a homogeneous representation of our target persona: an international student (25-35 years old) conducting research, whose motivations are to locate items related to the research in NMAI and look at resources outside the museum. This persona was targeted for the focus group since one of the members of Unified Designs had access to this subset of the target population (convenience). Homogenous audiences are critical for focus group success. In order to get people comfortable enough to offer up their opinions they need to feel that they are among peers and their contribution will be valued and not judged (Kuniavsky, 2003). Seven graduate students participated in the focus group. Prior to their participation, they completed a 23-question screener survey to find out their demographic information, familiarity with augmented reality, and their use of smartphones and other mobile devices.

Procedure

The first half of the focus group introduced the participants to AR, quick-response (QR) codes, image recognition, and the three applications we were interested in exploring. The second half focused on how these applications were integrated into the NMAI prototype. The focus group script is included in appendix B.

Goals/Objectives

We conducted this focus group to explore the following topics:

- Understand what attracts (potential) museum visitors to try Augmented Reality features
- Understand what makes using Augmented Reality features more compelling than the alternative (museum-provided visuals and information)
- Understand users' attitudes toward proposed Augmented Reality features
- Understand how users would expect to access an Augmented Reality experience

Mapping Objectives to Protocol Questions

Goal/Objective	Example Questions
Attraction: Understanding what would attract (potential) museum visitors to try Augmented Reality features	• What would motivate you to use an augmented reality feature?
Compelling: Understanding what would make using Augmented Reality features more compelling than the alternative (museum-provided visuals and information)	• How do you think augmented reality features compare against the visuals you regularly see in a museum, such as placards in front of objects and other visuals?
Attitude: Describing users' attitudes toward proposed Augmented Reality features	• From these examples, which one appeals most to you to see in a mobile app? Please elaborate. • What AR feature would you most like to see in a mobile app for a museum?
Expectation: Knowing how users would expect to access an Augmented Reality experience	• How would you expect a museum to advertise this mobile app? • Have you seen QR codes before?

Process Model

The first half of the focus group concentrated on introducing the concept of augmented reality. The group was shown YouTube video examples of each application of AR we were interested in exploring: image recognition, 3D image, and event experience.

From the examples shown, image recognition appealed to some of the participants, one stated, “I would say the most interesting part is that you can get the information about the object you are seeing right now. You don’t have to enter a name for it in a search engine and you do not have to figure out what it

actually is you just need to take a picture of it to get the information you want. I think that it is really helpful and yeah, it is really interesting." Participants were also impressed with the 3D imaging since many of them have not seen this technology applied in this medium before. The main motivations for using AR are for fun "Maybe for fun" and direction (figuring out their location in the present space) "For directions, it looks very useful". The two features most participants (40% preference for each feature) were interested in exploring further were the 3D imaging and image recognition. Comparing augmented reality features against the traditional information (placards and banners) found throughout the museum, some of the responses from the participants included:

> "For me, I would say I definitely want the new one. As I can remember when I walk in a museum, the information is often limited by the physics (physical) space there so you maybe you need to leave a tiny message there in the wall but with this app I can see how information can get and how you can interact with those in motion, so that's really cool."
>
> "For me it depends on rather I go to the museum for fun or for knowledge. Sometimes when a group of people go to the museum it's just to enjoy themselves for fun. Sometimes when I go to the museum by myself I want to enjoy this art and everything. I definitely like the image recognition to help me know the background of this art."
>
> "It depends on my purpose. If I want to learn more about something, I definitely want to receive more information because you know when I go to the museum and see the real item there and attach some words…instruction, that is very limited. Maybe I could use some tool to help learn more about the background and related information, I think that's better. For research purpose, it's better. Going for fun, I would like to have a more visual effect."

The second half was a review of the NMAI mobile app prototype. Questions were created (see Appendix C) for participants to rate their personal preference of the AR features and how valuable it was towards a museum visit. Participants rated each AR feature they viewed from the prototype. Although all three features were assessed favorably by the majority of participants, the interactive 3-D model was rated by 40% of the respondents as most likely to be used and also perceived as being the most valuable for the museum experience. The image recognition driven information overlay feature was also rated favorably, with a 40% of the participants seeing this as the second most valuable tool for museum visits. The ability to relive a past experience was the only feature that received a single 'not likely' rating for its perceived usefulness and value towards a museum visit.

During the open discussion, which covered many of the topics mentioned above, the participants spent a few minutes talking about QR codes. The participants were familiar with these codes from seeing them on campus, marketing campaigns, and other internet advertisements.

After seeing the AR features in the prototype, some of the participants' thoughts included:

> "It's really interesting. It's going to bring a lot of volume to the museum because I'm not the person who likes to go a lot to museums. You know with the picture, you cannot touch it, you

cannot know the information behind the object so probably this application will give me more information on it."

"This application is kind of a combination of several different applications. I downloaded the scan the code application in my cell and I'm not sure if you just take the picture and the application will search on line for you cause there is high requirement for the picture, since you cannot take it unclearly so I'm just a little bit worried on that part."

"In seeing image recognition, is it really necessary here? Because we can just give it a QR code."

Participants also felt that AR will make a museum visit a more compelling experience with more information than they are used to receiving during a museum visit.

"For me, I would say I definitely want the new one. As I can remember when I walk in a museum, the information is often limited by the physics (physical) space there so you maybe you need to leave a tiny message there in the wall but with this app I can see how information can get and how you can interact with those in motion, so that's really cool."

Their responses to the question, "How would you expect a museum to advertise this kind of mobile app?" included:

"E-mail."

"I think the museum. If we go through the museum I hope it can give me some instruction."

"Yeah, the museum should provide some introduction… some instructions."

Participants were also asked the question, "Do you think augmented reality is complicated?" They all felt it was relatively easy to do.

"It might be complicated to implement but it's really simple to use."

"For some old man it might be complicated but for us it's okay."

The participants were also asked in the written questionnaire what changes they would make to the AR features if they had the chance, some of their responses included:

- "Maybe you can add the search function"
- "I think this App is really amazing. If I am a user, I would prefer a 'map' function in it. I would like to know the location of each item and how to find them. Furthermore, if I am lost in the museum, I hope this app can help me to find where I want to go."
- "Maybe we could combine 3D and Image recognition together to increase the attraction of app. Because 3D and Image recognition provide different user experience."

- "It more like a combination of several kinds of applications so probably I would add some other features to it, and 'save it for later use' or add more links that use may be interested.
  To be honest, it's a really interesting idea and may help me to find more fun in museum"

Data Analysis

Using methods identified by Kuniavsky, the audio recording of the focus group was transcribed by a member of Unified Designs. The entire recording was not transcribed but only those portions that were considered most important. The transcribed quotes were then matched up with the focus group script. Coding was driven by the questions outlined in the focus group script and notes taken from the debriefing after the focus group. Themes were extracted from the coded document by looking at the trends and also using 'gut-level analysis' to organize the information into a useful format.

Themes and Hypothesis

After analyzing the data, several themes emerged including:

A. Implementation of technology related to augmented reality
    a. Purpose and use of QR Codes
B. Motivation for using augmented reality in a mobile app
C. Purpose for Augmented Reality features – fun vs. education
D. Attitude towards existing augmented reality features on the prototype
E. Exploration, using directions to navigate your way in space
F. Preference of augmented reality features

A. Implementation of technology related to augmented reality

Focus group participants had some awareness that certain augmented reality features, in particular image recognition, would be difficult to implement in a mobile application. They were also interested in how QR codes work with the application. This theme expands upon one of the topics for the focus group: knowing how users would expect to access an augmented reality experience. Below are excerpts from the focus group transcript that describes this theme:

Ying – "Just like the video we just showed you, you hold up your phone to a picture in the back and you will see the information overlaid on top."
37:20 – Participant 1 (male) – "So do I have to select the object first from that list?"

Tangier – "No with this one, your phone would be able to recognize it. So when you are walking around, your phone would recognize it based on the image that was uploaded to the backend of the app"
55:21 - Participant 1 (male) – "In seeing image recognition, is it really necessary here? Because we can just give it a QR code." 55:36 - Katherine – "Sometimes is just a cosmetic thing for some of the curators who like to see the dots or if it's a really premier or primary piece they may want to use the image recognition that way more people can get access to it. QR code only maybe 3 or 4 people can do it once." 55:58 - Participant 1 (male) – "Right, right" 56:00 – Katherine – "That's great on a pizza box but on a 300,000 year old piece of artwork do we want to stick the little thing? From having talked to some museum people, that is kind of their apprehension too, the code, so yeah."

B. Motivation for using augmented reality in an app

Participants had several ideas for why one would use augmented reality. Additional quotes are listed below:

Participant 1 (male) "Maybe for fun" Participant 2 (male) "If it's free, I would use it definitely" Participant 3 (female) "For directions, it looks very useful"
Participant 1 (male) "Yeah, if I have been to the museum before if they implement this feature, I would definitely go again. That sounds really interesting and will be a compelling new experience."

C. Purpose for Augmented Reality features – fun vs. education

While participants were interested in how augmented reality can enhance their current museum going experiences. They could see that this technology has dual roles in fun and education.

Participant 3 (female) "It depends on my purpose. If I want to learn more about something, I definitely want to receive more information because you know when I go to the museum and see the real item there and attach some words…instruction, that is very limited. Maybe I could use some tool to help learn more about the background and related information, I think that's better. For research purpose, it's better. Going for fun, I would like to have a more visual effect."
Participant 2 (male) – "For me it depends on rather I go to the museum for fun or for knowledge.

Sometimes when a group of people go to the museum it's just to enjoy themselves for fun. Sometimes when I go to the museum by myself I want to enjoy this art and everything. I definitely like the image recognition to help me know the background of this art."

D. Attitude towards existing augmented reality features on the prototype

One of the participants had some experience with building mobile applications and was intrigued by the augmented reality aspect. Overall participants liked the ease of access to additional information.

Participant 1 (male) – "I would say the most interesting part is that you can get the information about the object you are seeing right now. You don't have to enter a name for it in a search engine and you do not have to figure out what it actually is, you just need to take a picture of it to get the information you want. I think that it is really helpful, and yeah, it is really interesting."
Participant 2 (male, self-identified app developer) - "Actually I'm very impressed by the use of paper and scanning and seeing the 3D image of it, I've never seen something like that before" – in reference to the YouTube video from the Getty museum.
Participant 1 (male) – "For me, I would say I definitely want the new one. As I can remember when I walk in a museum, the information is often limited by the physics (physical) space there so you maybe you need to leave a tiny message there in the wall but with this app I can see how information can get and how you can interact with those in motion, so that's really cool."
Participant 1 (female) – "It's really interesting. It's going to bring a lot of volume to the museum because I'm not the person who likes to go a lot to museums. You know with the picture, you cannot touch it, you cannot know the information behind the object so probably this application will give me more information on it."

E. Exploration, using directions to navigate your way in space

Although participants were unfamiliar with augmented reality overall, there were many comments centered on how AR could be used for directions, maps, etc.

Participant 1(male) – "I would say that it's an application to help you explore a place you never been before. Maybe you can literally drive forward or turn around the corner and try to see what is there without being there." Participant 2 (male) – "Maybe a location and how to go there?"
"I think this App is really amazing. If I am a user, I would prefer a 'map' function in it. I would like to know the location of each item and how to find them. Furthermore, if I am lost in the museum, I hope

this app can help me to find where I want to go." ***pulled from written questionnaire

F. Preference of augmented reality features

Participants were impressed with the augmented reality features presented to them during the focus group. The 3D image technology was the most impressive to the majority of participants.

Participant 1 (female) – "I prefer the 3D image"
Participant 4 (female) – "I think the 3D image function is amazing because I think I don't need to spend time to go to the museum. If I want to see something, if I want to know something I use the code to print it out and use the computer and you can see the 3 dimensions of the thing, something so that's cool."
Participant 2 (male) – "I like the image recognition"
Tangier – "Without worrying about time, money, how it would actually be implemented or even if it's possible. What's one thing in a mobile application for a museum that you haven't seen before?" Participant 1 (female) – "The 3D image one"

Each of the themes outlined above supports our initial goals for the focus group:

- The implementation of AR technology falls under the expectation goal of users knowing how to access an augmented reality feature.
- The participants' interest in the implementation of QR codes gave Unified Designs some insight on how people might perceive these codes if seen in the museum.
- The theme, motivation for using augmented reality in an app, provides insight into understanding what would attract museum visitors to use an AR feature.
- Fun vs. education with AR and attitudes toward the existing AR features were two prevalent themes. The ideas that came out from these themes will help Unified Designs in understanding what makes AR more compelling than the standard museum features.
- "Exploration, using directions to navigate your way in space" was a theme that participants had awareness of. They were interested in how AR technology can make navigating in the museum and outside world easier.

The preferences of the participants' AR features provide information to support the themes that emerged from the discussion. This information lines up with the pre-existing goals of the focus group of understanding the attitudes of using the proposed AR features in the prototype. The observation chart below shows the participants' feedback and how it lines up with the goals established for the focus group.

Observations (Extracting Trends)

The table below shows the connection between the quotes taken from the focus group and how they align with the goals of Unified Designs:

Quotes	**Goal**	**Analysis**
Participant 1 (male) "Maybe for fun" Participant 2 (male) "If it's free, I would use it definitely" Participant 3 (female) "For directions, it looks very useful"	Attraction	The feedback supports augmented reality as an appealing way to enhance user experience; purposeful, fun and free.
"For me, I would say I definitely want the new one. As I can remember when I walk in a museum, the information is often limited by the physics (physical) space there so you maybe you need to leave a tiny message there in the wall but with this app I can see how information can get and how you can interact with those in motion, so that's really cool." "My opinion is the same as Soren's opinion. It depends on my purpose. If I want to learn more about something, I definitely want to receive more information because you know when I go to the museum and see the real item there and attach some words…instruction, that is very limited. Maybe I could use some tool to help learn more about the background and related information, I think that's	Compelling	This feedback supports the idea that augmented reality is more compelling than the current museum experience.

better. For research purpose, it's better. Going for fun, I would like to have a more visual effect."		
"I think the 3D image function is amazing because I think I don't need to spend time to go to the museum. If I want to see something, if I want to know something I use the code to print it out and use the computer and you can see the 3 dimensions of the thing, something so that's cool."	Attitude	This feedback provides information on the general attitudes towards augmented reality helping Unified Designs how this product may be understood by the general community.
- Participant 1 (male) – "In seeing image recognition, is it really necessary here? Because we can just give it a QR code." Katherine – "Sometimes is just a cosmetic thing for some of the curators who like to see the dots or if it's a really premier or primary piece they may want to use the image recognition that way more people can get access to it. QR code only maybe 3 or 4 people can do it once." Participant 1 (male) – "Right, right"	Expectation	This feedback provided Unified Designs with insight into how users would expect to access the augmented reality features.

Limitations

The limitations of the focus group:

1. Unified Designs was unable to conduct additional focus group testing due to schedule constraints.
2. Without a second focus group testing, UD was unable to compare results and confirm trends and themes.
3. Malfunction of the pre-group survey.
4. Participants' prior acquaintance with a Unified Designs group member.
5. Inexperience of the team as focus group facilitators.

Conclusion

The themes extracted from the focus group were used to create suggested changes to the prototype. The participants' interest in using AR to navigate, implementation of QR codes, and their motivation to use the application provided insight into the updates to consider for the prototype. Due to the constraints outlined in Unified Designs project plan, not all potential changes will be considered including adding new features to the mobile application.

The results from this and the previous round of testing including revisions to the prototype will be presented in a final report to stakeholders.

Potential Changes to the Prototype:

1. Add a link to the tours featuring augmented reality elements to the "Tours" section of the prototype.
2. Remove the "Community" page and replace with a page to access all augmented reality features within the mobile application.
3. Add a 2D map of where to find augmented reality opportunities in the museum.
4. Remove QR Scan Code page to allow the user to click '3D image' and see the requested information so they can view this content directly in the mobile application.
5. Tie information to QR codes that can be accessed anywhere and also QR codes that can only be found in the museum.

Appendices

Appendix A – Pre-Survey

Focus Group Survey

Questions

Question Group 1

1. Please enter your name:

(Short Answer Question, 0 points, 1 attempt permitted)

2. Please enter your email address for our contact information.

(Short Answer Question, 0 points, 1 attempt permitted)

3. How old are you?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
0 - 24
25 - 35
36 - 45
46 and above

4. What is your gender?

(Pick One Question, 0 points, 1 attempt permitted)

5. What is your race?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
Hispanic/Latino
African-American (non-Hispanic)
White (non-Hispanic)
Asian (non-Hispanic)
Native Hawaiian or other Pacific Islander (non-Hispanic)
Two or more races (non-Hispanic)

6. If your race was not specified in the previous question, please enter it below:

(Short Answer Question, 0 points, 1 attempt permitted)

7. Which of the following best describes your primary occupation?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
student
educator
researcher
working professional
other (please specify in the next question)

8. Please specify your occupation:

(skip if this question if not applicable to you)

(Short Answer Question, 0 points, 1 attempt permitted)

9. Have you ever participated in a focus group before?

(Pick One Question, 0 points, 1 attempt permitted)

Choice

yes
no

10. Are you currently participating in or conducting any other academic research?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
Yes, please describe in the next question.
No

11. Please describe your current academic research below:

(skip this question if not applicable to you)

(Short Answer Question, 0 points, 1 attempt permitted)

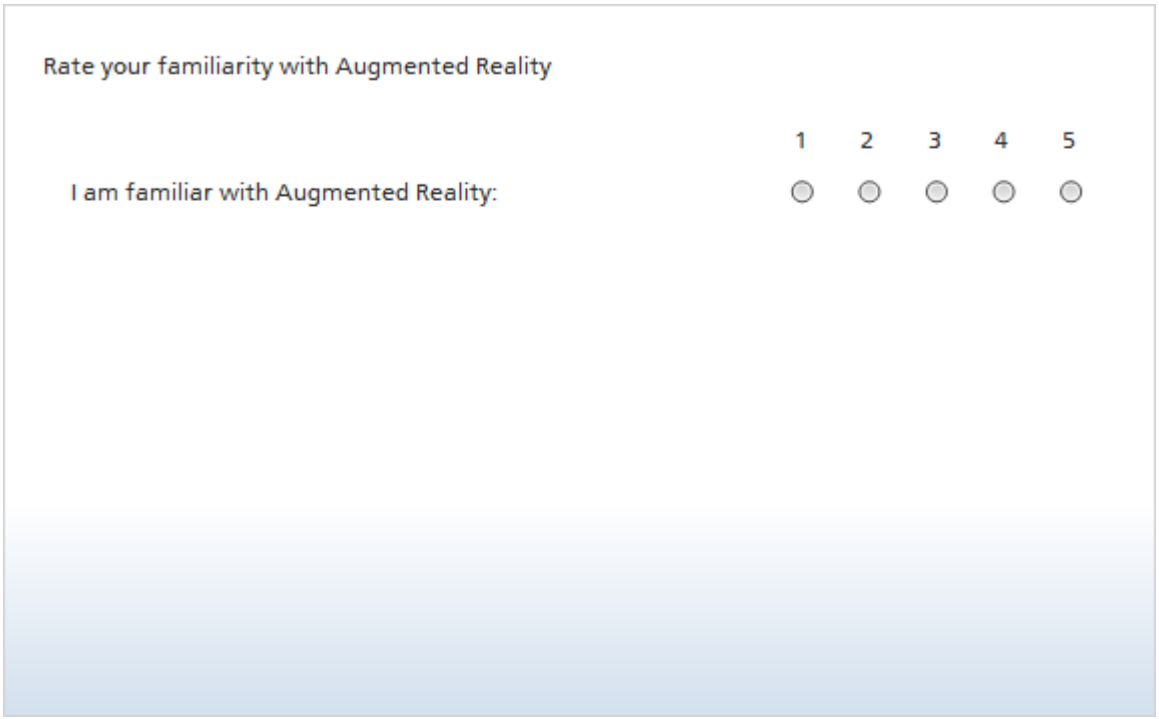
12. Is English your primary language?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
yes
no

13. Rate your familiarity with Augmented Reality

(Likert Scale Question, 0 points, 1 attempt permitted)



14. Have you ever used an augmented reality application?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
yes
no

15. Do you own a smart phone or tablet PC?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
yes

no

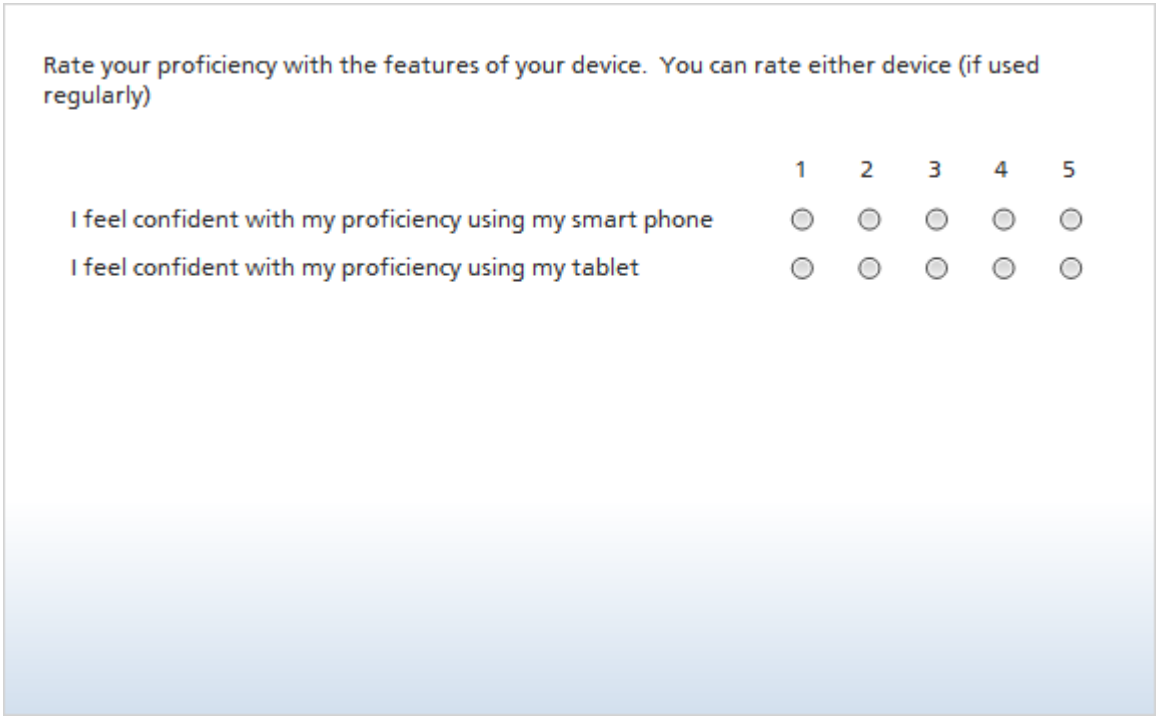
16. Do you regularly use your smart phone and/or tablet PC?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
Yes
No

17. Rate your proficiency with the features of your device. You can rate either device (if used regularly)

(Likert Scale Question, 0 points, 1 attempt permitted)



18. How often do you use mobile applications on your smart phone or tablet?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
daily
weekly
monthly
seldom
never

19. How many times have you attended a museum in the last 12 months?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
0
1
2
3 or more

20. How many times have you attended the National Museum of the American Indian (NMAI) in your lifetime?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
0
1
2
3 or more

21. Which of the following best describes the most common reason you visit museums? Select all that apply.

(Pick Many Question, 0 points, 1 attempt permitted)

Choice
academic research
personal education
entertainment
other, please specify in the next question

22. Please describe the most common reason you visit museums:

(skip this question if not applicable to you)

(Short Answer Question, 0 points, 1 attempt permitted)

23. How far do you live from the National Mall in Washington, D.C., and NMAI?

(Pick One Question, 0 points, 1 attempt permitted)

Choice
0 - 99 miles
100 - 250 miles
more than 250 miles within the U.S.
more than 250 miles--international

Appendix B – Focus Group Script

Introduction (~10 minutes)

Welcome!

My name is Tangier, and I am a researcher at George Mason University. Today, we will be reviewing a smart phone application for the National Museum of the American Indian. Before we begin, I want to make it clear that I am not working for, being compensated by, in any way under contract with, or representing the museum today. I'm here to get some of your thoughts and opinions about the mobile application and your experience with the added augmented reality feature for museum visitors. I did not develop this prototype, and I have no emotional attachment to any of the things we will be discussing today, so feel free to say whatever you want.

You were all chosen based on your responses to a blind online questionnaire. We invited you here today because you represent one of our user profiles. In other words, you all are a segment of the museum visiting population who might visit the National Museum of the American Indian. Today we're going to talk about some of your experiences so that Unified Designs can create an application that is best tailored to visitors like you and that achieves its educational goals.

This will be a pretty casual discussion, with a few key focal points which I will identify for you as we go. It's critical that you be as candid as possible. No one's feelings will be hurt, so please say exactly what you feel. There are no right or wrong opinions, and you are free to disagree with anyone in the room in a respectful manner. We do ask you, however, to speak one at a time during the discussion.

We're going to try and keep our discussion under an hour today, so I may occasionally ask you to wrap up a comment or hold your thoughts so that we can stay on track. There are a couple of application developers here from Unified Designs who will be observing today and taking notes. Feel free to ignore them.

Today's session will be audio-taped, so that I don't have to be distracted taking notes during facilitation. This recording is for research purposes only, and will not be used by anyone outside the development team. I'm going to read you a statement of informed consent, and I'll ask you all to sign a copy prior to beginning our questions.

<<Read, distribute, and collect Informed Consent forms.>>

Any questions before we begin?

Let's all introduce ourselves. I'd like to go around the room and have each person share three things:

1. Your first name
2. What is your favorite mobile app?
3. Your favorite museum, and why it's your favorite

General Exploration of Augmented Reality (~20 minutes)

Topics:

Augmented Reality Experiences (*the below items should be written on the board so participants can keep these terms in mind when answering questions about the mobile app and AR)*

1. 3D Models
2. Overlay/Image Recognition {let's be sure to use the correct industry term for the focus group}
3. Event Experience {let's be sure to use the correct industry term for the focus group}

Activity:

Show examples of Augmented Reality – QR codes, Image Recognition, and Location based interactions. (YouTube videos and other sources on the web can show examples of how the above are used)*

Video 1 – Overall review of AR

Video 2 – YouTube video showing use of QR codes – with an Event Experience

Video 3 – YouTube video showing use of Image Recognition

Video 4 – YouTube video showing use of QR codes – with a 3D Model

Video Discussion/First Impressions of AR:

After watching the video clips, the moderator will open the floor to discussion asking participants what do they think of augmented reality and the use of Image Overlay and QR code technology in smart phone applications based on what they just watched.

- When you hear the words, Augmented Reality, what does that bring to mind?
- From these examples, which one would you most like to see in a mobile app? What appeals to you the most to be used in a mobile app? Please elaborate.
- Can you think of reasons why you would choose not to use augmented reality in a smart phone application?
- What AR feature would you most like to see in a mobile app for a museum?

Feature Prioritization Exercise (~20 minutes)

Demonstration activity: Testing the application

Present the various AR scenarios to the participants. This will be done via overhead projector. As you access the AR sections of the app, speak aloud the steps taken to access the AR elements in the Prototype.

Scenarios:

Image recognition: You are at the NMAI on your first visit wanting to try out the mobile app you just downloaded to your smartphone. Pulling out your phone and accessing the app, as you walk around the main room of the museum, you are able to see information overlaid various items in the museum:

- **Canoe (Hawaiian Outrigger Canoe)**
- **Navajo Artist**

QR Code – 3D Model: As a student, you want to study the most intimate details of an object within the museum. You notice a sign near some of the exhibits with a QR code attached. Using your smartphone and accessing the NMAI mobile app, you scan the QR code to view the information attached:

- **Bow**
- **Headdress**
- **Canoe (Yamana Canoe/Canoe Model with Accessories)**

QR Code – Event Experience: You have used the NMAI mobile app a few times and notice on your calendar that you have synced with the museum's special events section that there is a temporary exhibit displaying…

- **Huichol Car**
- **Ojibwe Tribe (ashinaabe stories)**
- **Wixarita Tribe (kiwa stories)**

***A written questionnaire will be distributed to the participants. As they view each AR feature within the app, they will rate the following:

- how likely they would be to use that feature
- how valuable the mentioned feature is to the app

They will also provide a written response on their initial impression of the feature after seeing the AR technology applied to the app.

The final question will be to rank the AR features of the app that would be most beneficial to their museum visit.

- If you could change one aspect of the application's AR features or add a feature, what would it be? Why?

Discussion: First impressions of mobile augmented reality

* So, what did you think of the *AR features added to the* application now that you have had a chance to see it within the prototype?

- Which feature do you think would be most beneficial to you?

*Would using augmented reality enhance or decrease your enjoyment of visiting the museum? Why or why not?

*Based on what you saw in the prototype application, do you think Augmented Reality is complicated? Difficult to understand?

Wrap-Up (~10 minutes)

Just a few more questions. We're nearly done. I'm going to ask you a brainstorming question, and then we'll go around the room and capture everyone's responses.

Without worrying about how it might be implemented or whether it's possible, what is one thing that you'd like a mobile application for a museum to do that you've never seen before?

<<Wait 30 seconds, then go around and discuss, recording answers and suggestions.>>

Based on our discussion today, if money were no object, what augmented reality experience would you design?

<<Wait 30 seconds, then go around and discuss, recording answers and suggestions.>>

- If you were to recommend our museum visitor experience AR enhanced application to a friend, who would it be, and why do you think they would like using it?

- If you could download this app today would you plan to continue using it in the future? If not, why?

Thank you all for participating today! If you think of anything else you'd like to add to the discussion, e-mail me at unified_designs@hotmail.com.

Appendix C – Written Questionnaire

Augmented Reality Questionnaire

Directions: As you view each Augmented Reality feature, please provide your overall rating on each item. There are also questions that require a short written response.

Augmented Reality Feature: Image Recognition – viewing extra information about what you are seeing via your mobile device's camera.

1. How likely are you to use this feature? Rate from 1 to 3.

'1' meaning would not likely use this feature to '3' meaning you would likely use this feature.

Not likely to use	Somewhat likely	Would definitely use
1	2	3

2. How valuable is the feature to a museum visit? Rate from 1 to 3.

'1' meaning not valuable as a feature for a visit to '3' meaning this feature is valuable.

Not valuable	Somewhat valuable	Extremely valuable
1	2	3

Augmented Reality Feature: QR Code – Interactive 3D Model of objects in the museum.

1. How likely are you to use this feature? Rate from 1 to 3.

'1' meaning would not likely use this feature to '3' meaning you would likely use this feature.

Not likely to use	Somewhat likely	Would definitely use
1	2	3

2. How valuable is the feature to a museum visit? Rate from 1 to 3.

'1' meaning not valuable as a feature for a visit to '3' meaning this feature is valuable.

Not valuable	Somewhat valuable	Extremely valuable
1	2	3

Augmented Reality Feature: QR Code – Event Experience (opportunity to see an event that happened in the same space but at a different time)

1. How likely are you to use this feature? Rate from 1 to 3.

'1' meaning would not likely use this feature to '3' meaning you would likely use this feature.

Not likely to use	Somewhat likely	Would definitely use
1	2	3

2. How valuable is the feature to a museum visit? Rate from 1 to 3.

'1' meaning not valuable as a feature for a visit to '3' meaning this feature is valuable.

Not valuable	Somewhat valuable	Extremely valuable
1	2	3

Closing Questions (please indicate your answers below)

1. Would you change anything about the AR features that you have seen today? Would you do anything differently if you were designing them?

2. Please rank the Augmented Reality features you have seen in order of your personal preference (1,2 and 3):

____ Image Recognition (museum's reality augmented with extra information about what you're seeing via your mobile device's camera)

____ QR Codes – Interactive 3D Image

____ QR Codes – Event Experience (opportunity to relive an experience that happened in the same space you occupy in the museum, but in a different time)

Appendix D – Informed Consent

Title of Research: National Museum of the American Indian (NMAI) Mobile App

Investigators: Gloria Barron, Tangier Bates, Heath Huff, Katherine Phillips, Ying Wu (GMU Instructional Technology Graduate Students)

Before agreeing to participate in the focus group, it is important that you read the following explanation of below. This statement describes the purpose, procedures, benefits, and precautions of the program.

Explanation of Procedures

You are being asked to participate in a focus group to investigate a newly developed mobile app design for users to be able to use augmented reality features on a mobile app within the Smithsonian's National Museum of the American Indian.

You will be asked for your opinions on the added augmented reality features in the mobile app.

Video/Audio Recording

You will be recorded via audio and also have some pictures taken during the focus group. These images and audio are not for public view and will be used for research purposes only.

Risks

You will not be at physical or psychological risk and should experience no discomfort resulting from the usability test.

Benefits

There are no direct benefits by participating in this focus group. However, your opinions about the designed app will be used to develop a better product based on your suggestions.

Confidentiality

All information gathered from the study will remain confidential. Your identity as a participant will not be disclosed to any unauthorized persons; only the researchers and those involved with the NMAI Mobile App project at GMU in EDIT 752 (the class this study is being conducted for) will have access to the research materials. Any references to your identity that would compromise your anonymity will be removed or disguised prior to the preparation of the research reports and publications.

Participation

Participation in this study is voluntary; refusal to participate will involve no penalty. Each participant is free to withdraw consent and discontinue participation in this project at any time without prejudice from this institution.

Questions

Any questions concerning the usability test, please contact by email: unified_designs@hotmail.com

Agreement

Your signature below indicates that you agree to participate in this study.

Signature of Subject: _____ Date: _____

Subject name (printed): _____

Appendix E – Focus Group Transcript

14:50 – Tangier – “When you hear the term augmented reality what does that bring to mind?”

15:03 – Participant 1(male) – “I would say that It’s an application to help you explore a place you may never been before. Maybe you can literally drive forward or turn around the corner and try to see what is there without being there.”

Participant 2 (male) – “Maybe a location and how to go there?”

16:20 – *Demonstration of Layar – example of Augmented Reality*

16:35 – Tangier – “Here are examples of how the app Layar works”

17:01 – *Demonstration of Image recognition – video features the subject using an iPad like device to demonstrate how image recognition works*

17:01 – Tangier – “The next video also deals with augmented reality but this one is another, I guess another subset another way to access it its basically image recognition where you would uh and I’ll wait till it comes up on video, you will be in space with your iPhone, iPad or what have you and be able to hold up to certain objects like this guy is doing right now. What would happen is that your phone would actually recognize an image and provide additional information based on that.

17:49 – Tangier – “So you see here he is holding the phone, you see the actual image and ‘tah dah’ more information is seen based off that. So its giving you more background just from your phone, just holding things up and being able to recognize table, ‘oh table what more can you tell me about this table that is not already posted?’”

18:18 – Ying – “There are 3D images of the pictures and that’s a map of the museum” (in reference to the YouTube video)

Tangier – “So again the directionals in space, so you know where you are going”

Participant 1 – “That’s cool”

18:30 – Tangier – “…maybe like google maps on steroids”

19:02 - Getty museum example

19:10 – Tangier – “This is just another example of how augmented reality can bring to life a 3D image. Pretty much bring that object you see in the glass case that says no touch. You can bring it on to your phone and see it from different directions.”

20:00 – *Demonstration of event experience*

22:10 – Tangier – “So now that you have seen actual examples of augmented reality, what do you think I guess, what appeals most to you to see in a mobile application? I know that there is a lot in there but

what jumped out at you, anything you are excited to see? Out of the 3D, image recognition and the one you just saw the event experience."

22:42 – Participant 1 (male) – "I would say the most interesting part is that you can get the information about the object you are seeing right now. You don't have to enter a name for it in a search engine and you do not have to figure out what it actually is you just need to take a picture of it to get the information you want. I think that it is really helpful and yeah, it is really interesting."

Tangier – *directing my question to another participant* "What do you think? Yeah you're the app developer…" (laughter from group)

23:13 – Participant 2 (male, self-identified app developer) - "Actually I'm very impressed by the use of paper and scanning and seeing the 3D image of it, I've never seen something like that before" – in reference to the youtube video from the Getty museum.

23:54 – Tangier – "So what do you think would motivate you to use an augmented reality feature? Like besides finding information without typing it in but what else do you think you could find out using augmented reality?

24:01 – Participant 1 (male) "Maybe for fun"

Participant 2 (male) "If its free, I would use it definitely"

Participant 3 (female) "For directions, it looks very useful"

24:26 – Tangier – "So uhm, out of the examples that we did show you what would you want to see in a mobile app created for a museum? Like what would be at the top of your wish list to see if you could only choose one. The 3D images, event experience, and image recognition where the guy held it up and you could see more information just based on your camera phone recognizing the image."

25:10 - Participant 1 (female) "I prefer the 3D image"

Participant 2 (male) "I like the image recognition"

25:35 – Tangier – "So comparing the augmented reality features you have seen through the YouTube videos, how do they compare against the visuals that you currently see in your regular museum visits? When you are going to Air and Space, Natural, Science etc."

27:00 – Ying (clarifying the question) – "Do you prefer the regular experience without the application or prefer to have something like this where you can get more from the regular experience?"

Participant 1 (male) – "For me, I would say I definitely want the new one. As I can remember when I walk in a museum, the information is often limited by the physics (physical) space there so you maybe you need to leave a tiny message there in the wall but with this app I can see how information can get and how you can interact with those in motion, so that's really cool."

28:00 – Participant 2 (male) – “For me it depends on rather I go to the museum for fun or for knowledge. Sometimes when a group of people go to the museum its just to enjoy themselves for fun. Sometimes when I go to the museum by myself I want to enjoy this art and everything. I definitely like the image recognition to help me know the background of this art.”

28:37 – Tangier – “I’m sorry I forgot your name”

Participant 3 (Melody) – “You can call me Melody”

Tangier – “What do you think? I know you don’t have a smartphone but if you had one…”

Participant 3 (Melody) – “My opinion is the same as Soren’s opinion. It depends on my purpose. If I want to learn more about something, I definitely want to receive more information because you know when I go to the museum and see the real item there and attach some words…instruction, that is very limited. Maybe I could use some tool to help learn more about the background and related information, I think that’s better. For research purpose, it’s better. Going for fun, I would like to have a more visual effect.”

29:51 – Participant 4 (female) – “I think the 3D image function is amazing because I think I don’t need to spend time to go to the museum. If I want to see something, if I want to know something I use the code to print it out and use the computer and you can see the 3 dimensions of the thing, something so that’s cool.”

30 minute mark – Demonstration of the NMAI Prototype to group participants

34:00 - Tangier – “This is what we envision you will see in the final mobile application. I will present each augmented reality feature as a scenario.”

Ying is driving the prototype

34:30 – Ying – “We first go to objects, then on your phone when you click on objects then you will see objects by exhibition, by the nations, by region and a library of all of the objects in the museum.”

Demonstration of Image recognition

Ying – “Just like the video we just showed you, you hold up your phone to a picture in the back and you will see the information overlaid on top.”

37:20 – Participant 1 (male) – “So do I have to select the object first from that list?”

Tangier – “No with this one, your phone would be able to recognize it. So when you are walking around, your phone would recognize it based on the image that was uploaded to the backend of the app”

Demonstration of 3D Model

41:50 – Participant 1 (male) – “Is the image loaded from the internet or downloaded?”

Tangier – “I don’t think it would download or save information to your phone but it would just be something you could see in that point in time. A future suggestion for unified designs is maybe to save this information so that if you are not in the museum at the time you can download it and view from your couch.”

Demonstration of Event Experience

43:52 Katherine – “You would only be able to access this video at the location so it likes another draw to get people to come back or gives them a little bit more detail. They had one every year called the power of chocolate, this big huge chocolate festival.”

Tangier – “So if you love chocolate and you missed out, you can always relive it”

Katherine – “Exactly, where they did it.”

44:54 – Tangier (*during demonstration of Ojibwe Tribe - Ashinaabe stories*) – “So now when your kids miss the story, you can always say ‘hey kids, look at the story again’ over and over. Kind of like a time machine in your back pocket.”

45:15 – Ying – “Even though you may miss an event, you can always go back to the museum and review what has been happening there. That’s good for a research project if you miss a seminar or something you can always go back and watch it.”

47:00 – *participants fill out questionnaire on the prototype augmented reality examples*

52:40 – Tangier – “So know that you have seen the AR features that were talking about using the YouTube video examples and that stuff within the prototype now so what do you think?”

52:50 – Participant 1 (female) – “It’s really interesting. It’s going to bring a lot of volume to the museum because I’m not the person who likes to go a lot to museums. You know with the picture, you cannot touch it, you cannot know the information behind the object so probably this application will give me more information on it.”

53:35 – Participant 1 (female) – “This application is kind of a combination of several different applications. I downloaded the scan the code application in my cell and I’m not sure if you just take the picture and the application will search on line for you cause there is high requirement for the picture, since you cannot take it unclearly so I’m just a little bit worried on that part.”

Tangier – “So hopefully technology will catch up a little bit more…”

54:17 – Katherine – “It will definitely be up more to the museum or the or when the owner of the thing that’s doing it when you hold up your phone on the backend within their in house system, they will have spent thousands and thousands of dollars to like go and take this machine and slowly go over every pixel

and take into account grandma going like this (holding her phone up with shaking hands) and that ends up costing a lot of money. Not everyone is doing it now because of that, it takes so much information."

54:53 - Ying – "So that's why the code is more accurate because once your phone has scanned the square code that is exactly what you will see. Unlike the image recognition where you have to take the exact image of the picture that can be linked to the server or system that will recognize the picture that you have taken and send you the information."

55:21 - Participant 1 (male) – "In seeing image recognition, is it really necessary here? Because we can just give it a QR code."

55:36 - Katherine – "Sometimes is just a cosmetic thing for some of the curators who like to see the dots or if it's a really premier or primary piece they may want to use the image recognition that way more people can get access to it. QR code only maybe 3 or 4 people can do it once."

55:58 - Participant 1 (male) – "Right, right"

56:00 – Katherine – "That's great on a pizza box but on a 300,000 year old piece of artwork do we want to stick the little thing? From having talked to some museum people, that is kind of their apprehension too, the code, so yeah."

56:21 – Participant 1 (female) – "I'm curious who provided information? If you scan a code you can see that the information without an outsider object will provide information? Is it…"

Ying – "Your husband will." (laughter from focus group)

56:47 - Participant 1 (female) – "So that means every item that comes out from the factory can be combined with some information?"

57:00 – Katherine (going to front of room where an image of a QR code is displayed) – "These dots are holding some type of digital information like binary codes, I'm such a layman sorry. These 3 boxes here it tells the camera this is the relationship, the x angle and y angle, the most important thing to them is this, this, this and this and then the shading (pointing at key spots on the QR code graphic)…If you were to go online you can create QR code for free. You can actually go online and create it."
57:40 – Ying –"Someone had to put information on that code, so that when you scan the code you can get information."

58:21 – Participant 1 (male) – "Actually, actually I think the QR code adds fire to the unique object. You can get through the item either through a database, online or website address."

Participant 2 (male) – "So the actual information is provided to the museum."

Group murmurs assent

59:04 – Ying – “It can include more information like a web address, email address, or image. For this one maybe just an item link. Now we have developed this barcode to that one.” – explaining difference between QR code and regular barcode.

59:16 – Tangier – “Have you guys seen QR codes like this before?”

Participants “Yes, around the building, bus, on campus…”

59:25 – Participant (female) – “Also I know you can download QR code for your air ticket and you can have it on your iPhone and go through, that’s cool.”

59:50 – Ying – “This just gives you an option, someone like my parents may not like the code they just want to go to the object and see the object but for younger people they have the ability to use all the application. That’s not removing the old fashioned way of visiting experience it’s just adding to the previous experience so that you have more options. Just like we have in a face to face class like this, we also have online so everyone can choose the way they want but in the previous time we don’t have such options.”

1:00:45 – Participant 1 (male) – “Is there any application that is implementing the image recognition?”

1:01:10 – Katherine – “There are some apps out there and they are trying to develop the kind that you know you are sitting somewhere…”

1:01:18 – Katherine – “Because individuals have to give permissions for this particular app to broadcast information about me. So let’s say you are passing me by and I’ve given this app permission, you can hold the app up to my face and it would read everything about me because I’ve already put that information in the system.”

1:01:37 – Katherine – “There’s all kinds of different apps for being in a museum and connecting with certain social groups. You sit in the restaurant and wonder if anyone from my water polo group is in the area so you hit the button and find out you have teammates two tables over…you as an individual is giving permission for that information to be everywhere …so not sure.”

1:02:15 – Tangier – “Based on your previous museum going experiences, do you think the AR you have seen is compelling for your next visit?”

1:02:30 – Participant 1 (male) – “Yeah, if I have been to the museum before if they implement this feature, I would definitely go again. That sounds really interesting and will be a compelling new experience.”

1:06:10 – Tangier – “How would you expect a museum to advertise this kind of mobile app? How would you want to know of its existence?”

1:06:11 – Participant 1 (male) – “Email”

1:06:20 – Participant 2 (female) – “I think the museum. If we go through the museum I hope it can give me some instruction.”

Participant 1 (male) – “Yeah, the museum should provide some introduction… some instructions.”

1:06:36 – Tangier – “Based on what you saw in the prototype and the examples from YouTube do you think augmented reality is complicated?

1:06:47 – Participant 1 (male) – “It might be complicated to implement but its really simple to use.”

Participant 2 (male) – “For some old man it might be complicated but for us it’s okay.”

1:07:19 – Tangier – “Without worrying about time, money, how it would actually be implemented or even if it’s possible. What’s one thing in a mobile application for a museum that you haven’t seen before?”

Participant 1 (female) – “The 3D image one”

1:07:56 – Tangier – “If you were to recommend this application to a friend, who would you recommend it to and why would you think they would like to use it?”

1:08:03 – Participant 1 (male) – “Some guy that never been to the museum”

1:08:16 – Participant 2 (female) – “The student from the history major”

Participant 3 (female) – “…or art history major”

Participant 2 (female) – “Yeah”

Participant 1 (male) – “Or some tourist”

Participant 2 (female) – “Or travel”

1:08:38 – Tangier – “Ok. So if we were able to give you this mobile app and say ‘go forward and use it’ would you use it?”

Group participants – “Of course.”

Participant 1 (male) – “A new experience, why not?”

End of Session

Appendix F – Coded Transcript

Round 2 Focus Group

Themes that emerged from the focus group discussion and written questionnaire are:

- Implementation of technology related to augmented reality
    - Purpose and use of QR Codes

Demonstration of 3D Model 41:50 – Participant 1 (male) – "Is the image loaded from the internet or downloaded?" Tangier – "I don't think it would download or save information to your phone but it would just be something you could see in that point in time. A future suggestion for unified designs is maybe to save this information so that if you are not in the museum at the time you can download it and view from your couch."
53:35 – Participant 1 (female) – "This application is kind of a combination of several different applications. I downloaded the scan the code application in my cell and I'm not sure if you just take the picture and the application will search on line for you cause there is high requirement for the picture, since you cannot take it unclearly so I'm just a little bit worried on that part." Tangier – "So hopefully technology will catch up a little bit more…" 54:17 – Katherine – "It will definitely be up more to the museum or the or when the owner of the thing that's doing it when you hold up your phone on the backend within their in house system, they will have spent thousands and thousands of dollars to like go and take this machine and slowly go over every pixel and take into account grandma going like this (holding her phone up with shaking hands) and that ends up costing a lot of money. Not everyone is doing it now because of that, it takes so much information."
55:21 - Participant 1 (male) – "In seeing image recognition, is it really necessary here? Because we can just give it a QR code." 55:36 - Katherine – "Sometimes is just a cosmetic thing for some of the curators who like to see the dots or if it's a really premier or primary piece they may want to use the image recognition that way more people can get access to it. QR code only maybe 3 or 4 people can do it once." 55:58 - Participant 1 (male) – "Right, right" 56:00 – Katherine – "That's great on a pizza box but on a 300,000 year old piece of artwork do we want to stick the little thing? From having talked to some museum people, that is kind of their apprehension too, the code, so yeah."
56:21 – Participant 1 (female) – "I'm curious who provided information? If you scan a code you can see that the information without an outsider object will provide information? Is it…" Ying – "Your husband will." (laughter from focus group) 56:47 - Participant 1 (female) – "So that means every item that comes out from the factory can be combined with some information?" 57:00 – Katherine (going to front of room where an image of a QR code is displayed) – "These dots are holding some type of digital information like binary codes, I'm such a layman sorry. These 3 boxes here it tells the camera this is the relationship, the x angle and y angle, the most important thing to them is this, this, this and this and then the shading (pointing at key spots on the QR code graphic)…If you were to go online you can create QR code for free. You can actually go online and create it." 57:40 – Ying –"Someone had to put information on that code, so that when you scan the code you can get information."

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59:04 – Ying – "It can include more information like a web address, email address, or image. For this one maybe just an item link. Now we have developed this barcode to that one." – explaining difference between QR code and regular barcode.
59:16 – Tangier – "Have you guys seen QR codes like this before?"
Participants "Yes, around the building, bus, on campus…"
59:25 – Participant (female) – "Also I know you can download QR code for your air ticket and you can have it on your iPhone and go through, that's cool."
59:50 – Ying – "This just gives you an option, someone like my parents may not like the code they just want to go to the object and see the object but for younger people they have the ability to use all the application. That's not removing the old fashioned way of visiting experience it's just adding to the previous experience so that you have more options. Just like we have in a face to face class like this, we also have online so everyone can choose the way they want but in the previous time we don't have such options."

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Demonstration of Image recognition
Ying – "Just like the video we just showed you, you hold up your phone to a picture in the back and you will see the information overlaid on top."
37:20 – Participant 1 (male) – "So do I have to select the object first from that list?"
Tangier – "No with this one, your phone would be able to recognize it. So when you are walking around, your phone would recognize it based on the image that was uploaded to the backend of the app"

- Motivation for using augmented reality in a mobile app

23:54 – Tangier – "So what do you think would motivate you to use an augmented reality feature? Like besides finding information without typing it in but what else do you think you could find out using augmented reality?
24:01 – Participant 1 (male) "Maybe for fun"
Participant 2 (male) "If it's free, I would use it definitely"
Participant 3 (female) "For directions, it looks very useful"

1:02:15 – Tangier – “Based on your previous museum going experiences, do you think the AR you have seen is compelling for your next visit?” 1:02:30 – Participant 1 (male) – “Yeah, if I have been to the museum before if they implement this feature, I would definitely go again. That sounds really interesting and will be a compelling new experience.”
1:06:36 – Tangier – “Based on what you saw in the prototype and the examples from YouTube do you think augmented reality is complicated? 1:06:47 – Participant 1 (male) – “It might be complicated to implement but its really simple to use.” Participant 2 (male) – “For some old man it might be complicated but for us it’s okay.”
1:08:38 – Tangier – “Ok. So if we were able to give you this mobile app and say ‘go forward and use it’ would you use it?” Group participants – “Of course.” Participant 1 (male) – “A new experience, why not?”
1:07:56 – Tangier – “If you were to recommend this application to a friend, who would you recommend it to and why would you think they would like to use it?” 1:08:03 – Participant 1 (male) – “Some guy that never been to the museum” 1:08:16 – Participant 2 (female) – “The student from the history major” Participant 3 (female) – “…or art history major” Participant 2 (female) – “Yeah” Participant 1 (male) – “Or some tourist” Participant 2 (female) – “Or travel”

- Purpose for Augmented Reality features – fun vs. education

28:00 – Participant 2 (male) – “For me it depends on rather I go to the museum for fun or for knowledge. Sometimes when a group of people go to the museum its just to enjoy themselves for fun. Sometimes when I go to the museum by myself I want to enjoy this art and everything. I definitely like the image recognition to help me know the background of this art.”
28:37 – Tangier – “I’m sorry I forgot your name” Participant 3 (Melody) – “You can call me Melody” Tangier – “What do you think? I know you don’t have a smartphone but if you had one…” Participant 3 (Melody) – “My opinion is the same as Soren’s opinion. It depends on my purpose. If I want to learn more about something, I definitely want to receive more information because you know when I go to the museum and see the real item there and attach some words…instruction, that is very limited. Maybe I could use some tool to help learn more about the background and related information, I think that’s better. For research purpose, it’s better. Going for fun, I would like to have a more visual effect.”

- Attitude towards existing augmented reality features on the prototype

22:10 – Tangier – “So now that you have seen actual examples of augmented reality, what do you think I guess, what appeals most to you to see in a mobile application? I know that there is a lot in there but

what jumped out at you, anything you are excited to see? Out of the 3D, image recognition and the one you just saw the event experience." 22:42 – Participant 1 (male) – "I would say the most interesting part is that you can get the information about the object you are seeing right now. You don't have to enter a name for it in a search engine and you do not have to figure out what it actually is you just need to take a picture of it to get the information you want. I think that it is really helpful and yeah, it is really interesting." Tangier – directing my question to another participant "What do you think? Yeah you're the app developer…" (laughter from group) 23:13 – Participant 2 (male, self-identified app developer) - "Actually I'm very impressed by the use of paper and scanning and seeing the 3D image of it, I've never seen something like that before" – in reference to the YouTube video from the Getty museum.
25:35 – Tangier – "So comparing the augmented reality features you have seen through the YouTube videos, how do they compare against the visuals that you currently see in your regular museum visits? When you are going to Air and Space, Natural, Science etc." 27:00 – Ying (clarifying the question) – "Do you prefer the regular experience without the application or prefer to have something like this where you can get more from the regular experience?" Participant 1 (male) – "For me, I would say I definitely want the new one. As I can remember when I walk in a museum, the information is often limited by the physics (physical) space there so you maybe you need to leave a tiny message there in the wall but with this app I can see how information can get and how you can interact with those in motion, so that's really cool."
52:40 – Tangier – "So know that you have seen the AR features that were talking about using the YouTube video examples and that stuff within the prototype now so what do you think?" 52:50 – Participant 1 (female) – "It's really interesting. It's going to bring a lot of volume to the museum because I'm not the person who likes to go a lot to museums. You know with the picture, you cannot touch it, you cannot know the information behind the object so probably this application will give me more information on it."

- Exploration, using directions to navigate your way in space

14:50 – Tangier – "When you hear the term augmented reality what does that bring to mind?" 15:03 – Participant 1(male) – "I would say that it's an application to help you explore a place you may never been before. Maybe you can literally drive forward or turn around the corner and try to see what is there without being there." Participant 2 (male) – "Maybe a location and how to go there?"
18:18 – Ying – "There are 3D images of the pictures and that's a map of the museum" (in reference to the YouTube video) Tangier – "So again the directionals in space, so you know where you are going" Participant 1 – "That's cool" 18:30 – Tangier – "…maybe like google maps on steroids"
- "I think this App is really amazing. If I am a user, I would prefer a 'map' function in it. I would like to know the location of each item and how to find them. Furthermore, if I am lost in the museum, I hope this app can help me to find where I want to go." ***pulled from written questionnaire

- Preference of augmented reality features**Add information from the written questionnaire here

Results from written questionnaire: Ranking – Personal Preference of Augmented Reality features - 40% of respondents rank the image recognition as their preferred augmented reality feature, 40% of respondents also ranked the 3D image as their preferred feature as well Ranking – Augmented Reality feature most beneficial for a museum visit - 71% of respondents ranked the image recognition as the most beneficial for a museum visit - 57% of respondents ranked the 3D image as the second best feature for a museum visit
24:26 – Tangier – "So uhm, out of the examples that we did show you what would you want to see in a mobile app created for a museum? Like what would be at the top of your wish list to see if you could only choose one. The 3D images, event experience, and image recognition where the guy held it up and you could see more information just based on your camera phone recognizing the image." 25:10 - Participant 1 (female) "I prefer the 3D image" Participant 2 (male) "I like the image recognition"
29:51 – Participant 4 (female) – "I think the 3D image function is amazing because I think I don't need to spend time to go to the museum. If I want to see something, if I want to know something I use the code to print it out and use the computer and you can see the 3 dimensions of the thing, something so that's cool."
58:21 – Participant 1 (male) – "Actually, actually I think the QR code adds fire to the unique object. You can get through the item either through a database, online or website address."
1:07:19 – Tangier – "Without worrying about time, money, how it would actually be implemented or even if it's possible. What's one thing in a mobile application for a museum that you haven't seen before?" Participant 1 (female) – "The 3D image one"

Appendix G – Focus Group Room Set Up

- Audio recording devices were set up at each end of the table

Bibliography

Kuniavsky, M. (2003). *Observing The User Experience: A Practitioner's Guide to User Research.*

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