CPSC 481

STAGE FIVE - TEAM L

User Centred Design Report

MUSEUM COMPANION APP

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Abstract

When designing a new application, one of the most important aspects to consider is the user interface. Most applications are capable of completing the tasks that they were created for, but whether the application actually gets any use is often correlated with the design of the UI. This report will show the steps that we took to create a UI for a museum companion app with AR features.

Since we wanted to create an app that both looked good and was easy to use, we followed a standard user centred design procedure. In this procedure we used the IDEO method cards to perform initial user research, then iterated over several prototypes using feedback gained from heuristic evaluations.

The result of this process was a hi-fidelity prototype that looks good and is highly usable by users with a wide array of skill sets.

Introduction

This project is an AR app aimed at people who visit museums. This app aims to replace the standard of looking at the physical plaque descriptions with being able to point your camera at an artifact, scanning it, and seeing or hearing the corresponding description in the app. The app also aims to provide AR models of artifacts with audio & visual descriptions and allows users to then take pictures with these AR models and post them to social media. The artifacts can also have relevant animations that users can view. This app aims to transform the typical museum experience into a more hands on and interactive one while also accommodating for people with disabilities or language barriers by providing multiple ways to consume information provided about the exhibits.

Description of Design Problem

The goal of this app is to create a UI that makes the AR features accessible for all users, eliminates or reduces the hassles that are often present when visiting a museum, and to foster a sense of community among museum goers.

Description of Design Solution

Our solution is to provide helpful guides and instructions to help users who are unfamiliar with the features that the app provides, while keeping the process and screen free of clutter that might detract from the usability of experienced users. We also decided to offer ways for users to rate, comment, and discuss exhibits that they visit.

End-users and Stakeholders

End-users for this app can be classified as students visiting the museum for classes, tourists who wish to learn about the history/art of the area, and professionals/hobbyists that work or are interested in the field or fields represented by the museums they visit.

The stakeholders of our app include but are not limited to:
Museum Staff: Staff will have the opportunity to direct customers to the app and demonstrate usability. They would also use it for editing artifact information, and other details about exhibits.
Exhibit Designers: They will use the app as a template to help them design. As looking at an overall map and seeing what consumers see is a valuable asset .
AR model Designers: They will be using the app to demonstrate their work. The AR functionality will be dependent on them
Donors: Donors will want to see what has come with thor donation. Whether it be an artifact or money. They will be quickly able to see how the museum has evolved quickly, and thoroughly examine each artifact using their phone
Volunteers: Volunteers who come to the museum may not always be caught up on all new exhibits and artifacts. The app will give them a chance to catch up quickly and learn without having to consult others.
Educators: Oftentimes museums or a place where many students will come to visit. Educators will find this app very useful to guide students on what they want them to see.

User Research:

Methods

The following are the User Research methods that were selected from 3 different categories of IDEO Cards:

- **Survey and Questionnaires** (Ask)
- **Competitive Product Survey** (Learn)
- **Scenarios** (Try)

Process

Competitive Product Survey (Learn):
We evaluated similar apps in the market, the two apps we chose to analyze were; British Museum Guide, Tourblink: British Museum.
We chose Tourblink: British Museum due to its popularity and satisfactory rating. We were able to identify the aspects of the app that were valuable and took note of them and included them in our design. Even though this app was well rated it did have flaws that we were able to pick up on and note as things we could implement better or to avoid.
We chose the British Museum Guide due to its low rating and negative feedback on the app store. We were able to recognize the aspects of the app that were lacking and frustrating, these were noted as things to avoid or implement better.
Even though this app was poorly rated we noted aspects that were done well and noted those as things to implement.

Survey and Questionnaires (Ask):
We surveyed potential museum visitors on Augmented Reality, their current interactions and experiences with artifacts at museums, and on preferences on aspects encountered in a museum. We did this by creating and sharing our survey link to our friends and fellow classmates. We created 7 questions for our survey that we felt adequately asked potential users information that would be beneficial to us in creating the features and design of our app.

Scenarios (Try):
We created a scenario revolving around a specific individual that was in need of all the features our app had to offer. We walked through every step the user would take to use our app and explained how he performed tasks.

Findings

Competitive Product Survey (Learn):
After using the two apps, the first thing that came to mind was that we did not want to lock any features behind in-app purchases. Next, we thought the overall user experiences for the apps were terrible, reading the text description/ viewing the images somehow felt worse than just using Wikipedia. However, not everything was terrible. We were able to get some ideas on how to improve their existing ideas. For example, British Museum Guide

had a map that just shows the location of the exhibits. We thought we could improve upon that idea by implementing a feature that highlights the visited location during a tour.

Survey and Questionnaires (Ask):
From this survey, we found out several things about potential users and their experiences/preferences. We found that most of the participants of the survey had little experience with AR apps or other museum apps, and also sometimes have difficulties reading plaques at museums. We also found that our participants would prefer their museum visits to be more interactive and prefer information to be displayed in a more visual way with less text. A large portion of the participants also reported that they find that language can be a barrier in their visits.

Scenarios (Try):
In the scenario we had described we wanted to see how someone who is technologically challenged would deal with the app. Usability is a very important thing and we wanted to ensure that this app is available to all. What we found out is that those who are technologically advanced may not want to seek the information themselves and ask for assistance. We also found out that users will quickly get frustrated on secretions they don't understand. It is important to have staff ready to help out with the app in case any issues arise.

Important design choices

We decided to make the prototype with only dark mode as we found that it not only makes it easier to read, but also reduces strain on the eyes of the users as well. We also decided to emphasize AR features since most of our users seem to prefer having information provided in more visual ways, and we felt that that it would make our app stand out from similar apps and that it was the best way to balance a minimalist UI design with ease of use and accessibility.

Lessons Learned from Low-Fi prototype

Set up the framework for our Hi-Fi prototype, solved core issues related to usability and proposed functionality, check and test functionality, Balsmiq cloud enabled us to collaborate easily and maintain consistency across wireframes.

Lessons Learned from Hi-Fi prototype

We made our prototype using Adobe XD and we had come across some issues. It came to our attention that Adobe XD does not have a very user-friendly interface, and had a very large learning curve compared to balsamiq. We also came across some limitations when creating the prototype, such as simulation of typing on a keyboard. We also had some issues translating things from low-fi to high-fi as not everything can be well translated. It becomes more apparent of your design choices in a hi-fi prototype as compared to low-fi, and keeping consistency in design is much more important. As you cannot keep a simple white background a design choice has to be made and it must keep consistent to convey a realistic app.

Heuristic Evaluation:

Process

We started our Heuristic Evaluation process by dividing our team into three evaluators and two reviewers.

Evaluators:

As an evaluator when conducting the heuristic evaluation, we first started by ensuring we understood each rule of thumb very clearly before we moved on. Since we are conducting the evaluation on our own prototype due to Covid-19 restrictions, it is important that we have no bias when we evaluate the prototype. Afterwards, we check each rule of thumb and run our prototype checking to see if each rule applies. Next, we run through the prototype a second time checking each rule to see if there exist any violations. Lastly, we take a look at how each rule can further improve the usability, utility, and desirability of our prototype.

Reviewers:

As a reviewer when conducting the review of the heuristic evaluations, we first established the severity rating scale. Then we each conducted our own review of the problems expressed in each of the heuristic evaluations. We analyzed each problem brought up by the evaluators in their evaluation and assigned a severity rating from (0-4) and stated our reasoning behind the rating in our review report.

Findings

After the heuristic evaluation of the prototype we were able to find several issues. Many of them were minor cosmetic issues, others were more drastic and needed more attention, we were able to identify this easily due to the severity ratings assigned to each problem. While developing the application, we were unaware of issues that a user might face but doing the heuristic evaluation allowed us to diagnose these usability issues easily. One major issue that we had failed to catch was error messages. Error messages are an integral part in every app, problems are bound to occur no matter what. Users cannot be expected to always know exactly how to use the app, and oftentimes they will stray away from the apps functionality. The developer must be ready for these issues, they must be able to anticipate issues to increase usability. An example of this was the AR scanning section, when scanning for an artifact there are a number of things that can go wrong. Even more so since the technology of AR is not commonly used. This can lead to several user errors that can frustrate the user and deter usability. By adding a quick error message if they cannot find the artifact, we begin to guide the user to how they should use the app. By doing this we increase usability, and improve user experience overall.

Design Changes Made

After Heuristic Evaluation in Stage Four

After the evaluation one glaring issue was presenting itself, we did not handle any errors, and this was a massive issue. Errors are a given in any system, and when that happens we need to help the user recover. We started by adding error messages to help users recognize and recover from these errors. We also added dialogue boxes for error prevention, and Improved visibility of system status by adding more notification messages. By doing this we had remedied a majority of the systems issues. Users need choice as well when dealing with an app, they do not want to feel limited. This is why we also implemented more sharing options when sharing an image to help the user share images easier.

During Stage Five

For stage five we implemented two new features. We added the ability to rate and comment on artifacts, and the ability to see what artifacts you have visited in the past and view them again from anywhere. We found that the additions of these features would help to foster a sense of community within the app. We tuned some features as well and added

an actual audio track to the audio description, error checking for the ticket page in case of insufficient funds, and some confirmation boxes before big changes.

Planned Future Changes

In the future, we plan to have support for the Google Cardboard VR system to allow users to visit museums virtually, which would improve accessibility by allowing individuals with reduced mobility to still have access to museums. We also plan to have support for museum employees to easily add new exhibit information via the app so that they can see any changes that they make in real time and test them immediately.

Conclusion

In conclusion this project demonstrated the process on how to start from a simple idea and fully flesh it out as a complete prototype. We learned how to create lo-fidelity and hi-fidelity prototypes. We learned to be able to evaluate our prototypes meaningfully and creatique it. This is an important skill that we gained, as it can be hard to assess your own designs and be able to find flaws in it. With this project being completely centered around usability, and ease of access, we were forced to look at our own designs with unbiased eyes, and come up with solutions and implement them to improve upon our previous designs.

Appendix

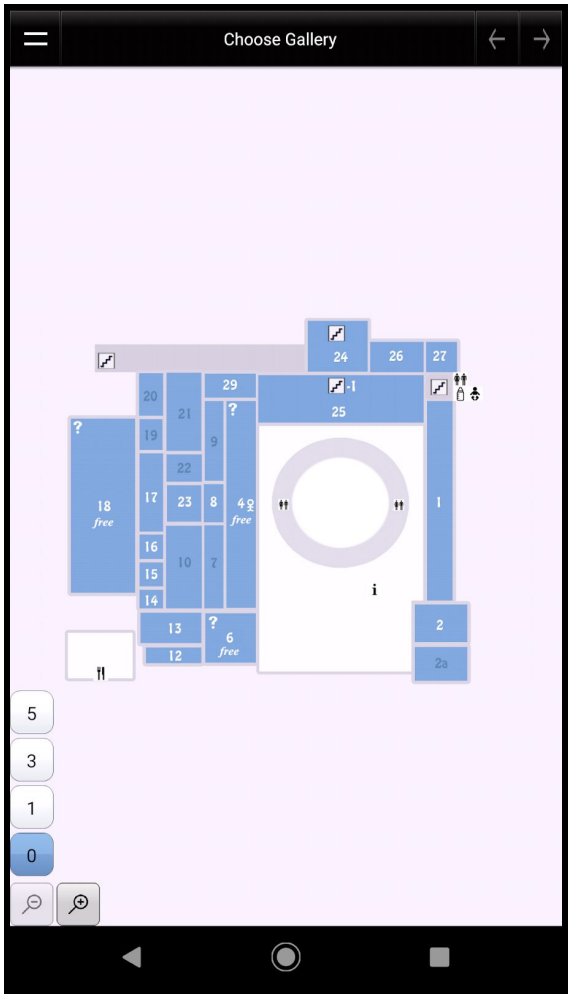
Repository: https://github.com/csj9703/CPSC-481-Project

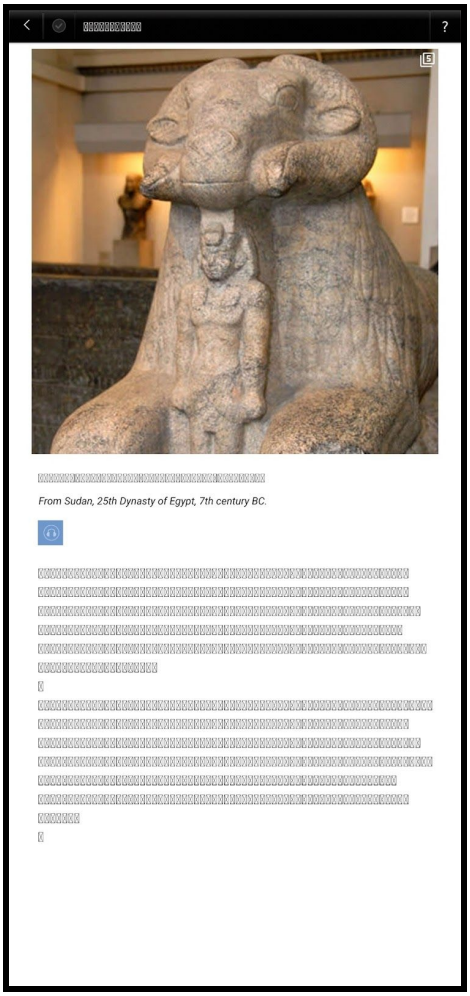
Portfolio: https://sites.google.com/view/teaml-cpsc-481-project/

User research:

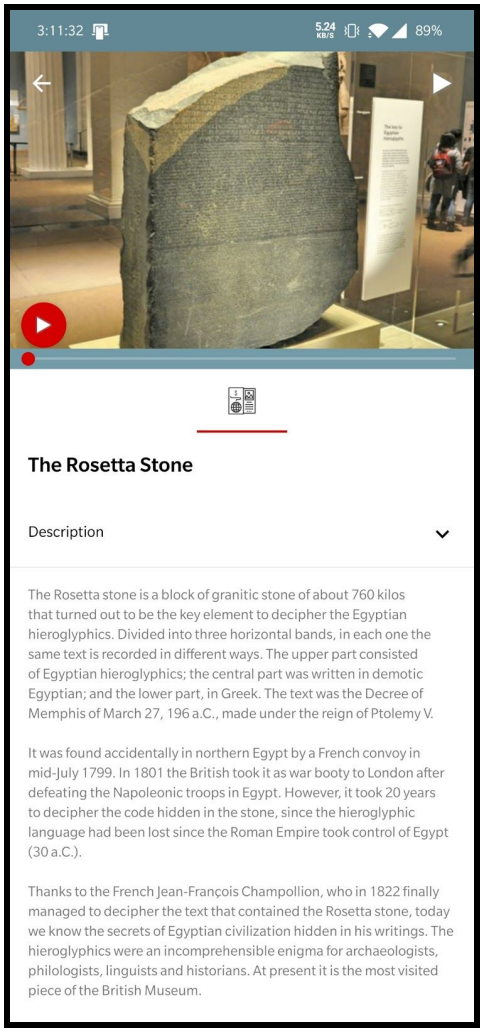
Competitive Product Survey:

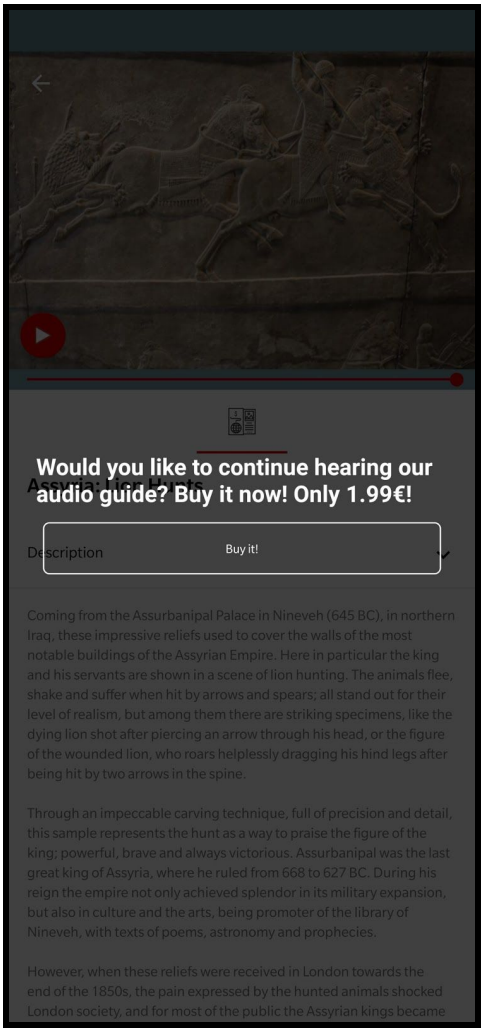
British Museum Guide





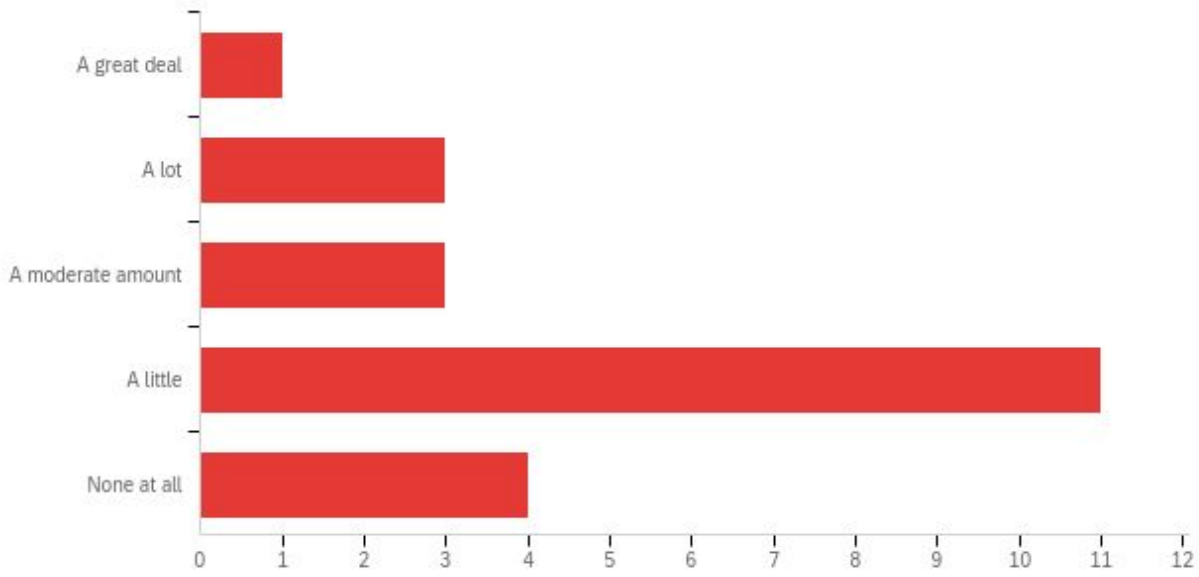
Tourblink: British Museum



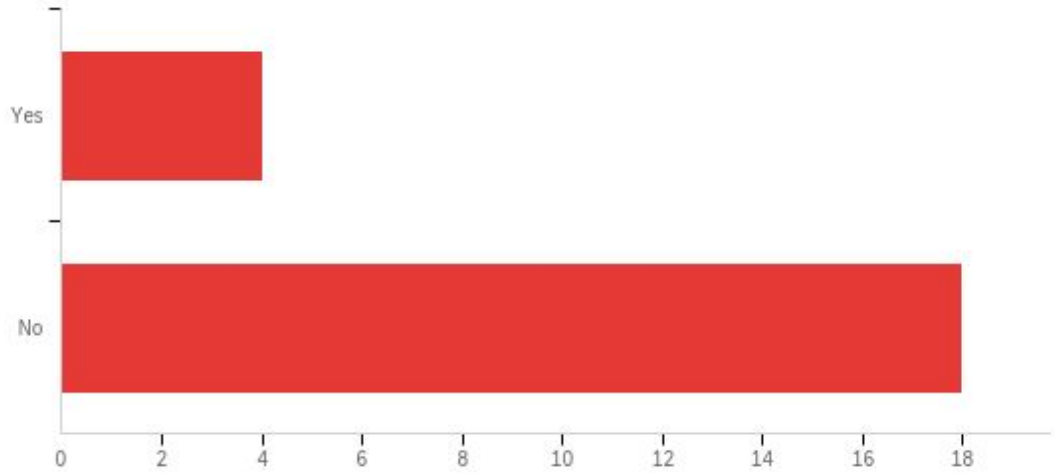


Survey Questions & User Response Data:

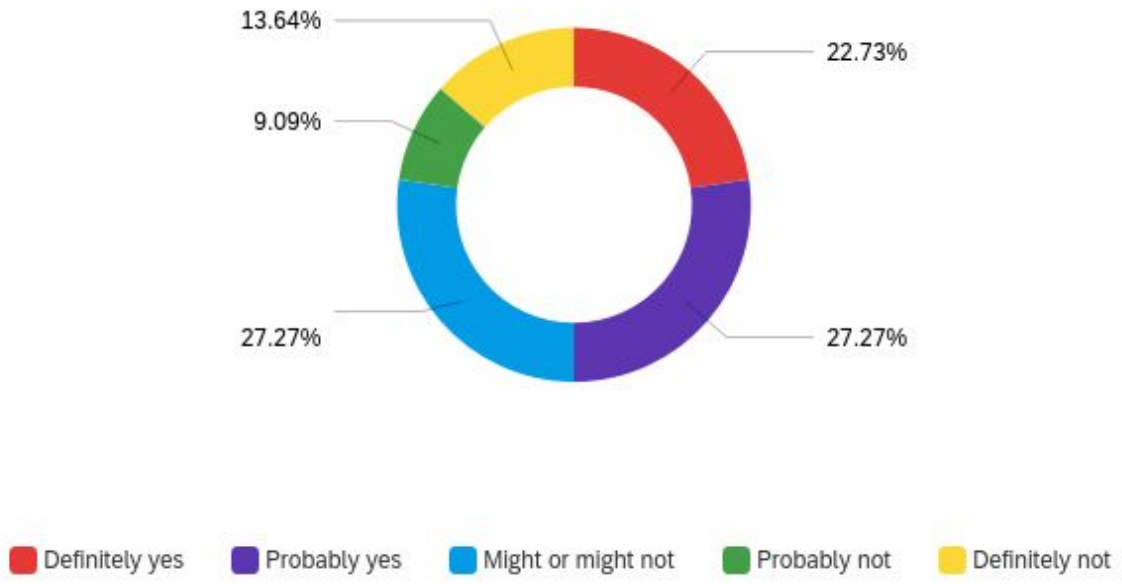
Survey question 1:
How familiar are you with AR (Augmented Reality) applications/ software?



Survey question 2:
Have you used a museum app before?

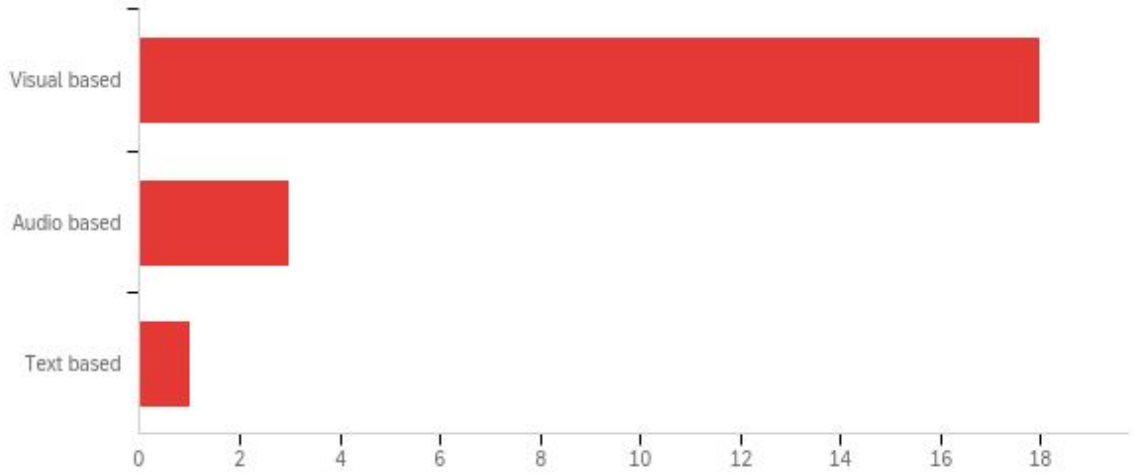


Survey question 3:
Have you ever had difficulty reading descriptions on plaques during your visits?

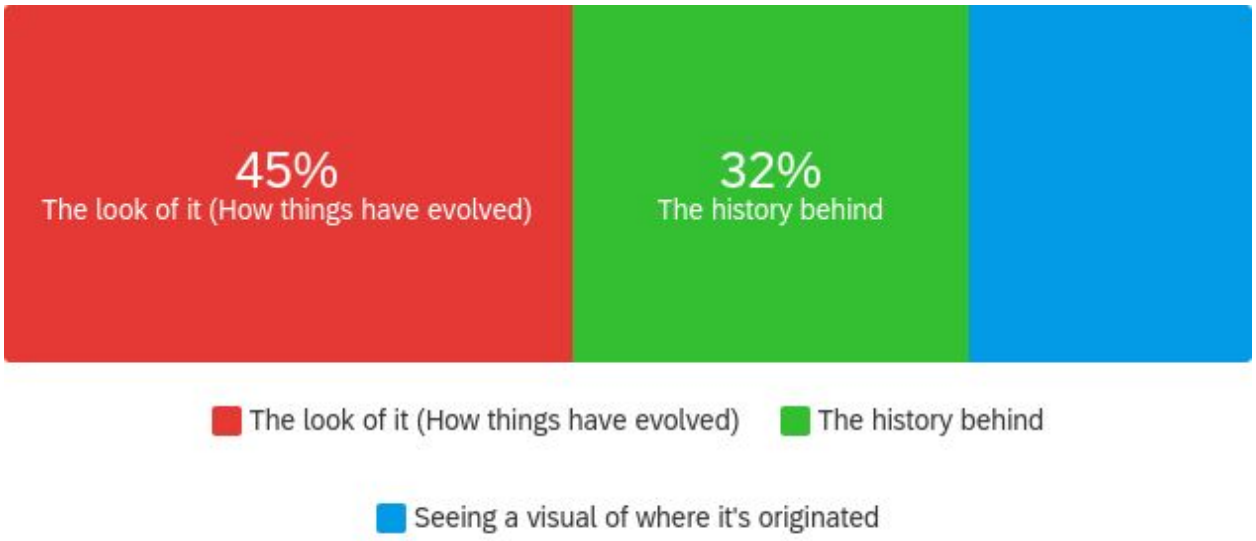


Survey question 4:
Would you prefer more interactive experiences in a museum?

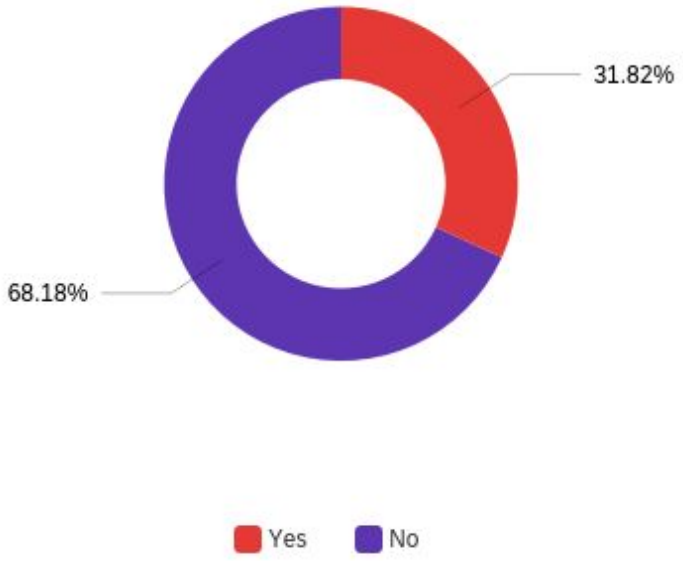
Survey question 5:
How would you prefer information be delivered?



Survey question 6:
What aspect of a museum exhibit do you find the most interesting?



Survey question 7:
Do you find language a barrier when visiting exhibits?



Full Scenario:

Vladimir Schmidtov is visiting from Russia and wants to see what museums are like in Britain. He has an auditory impairment, is paralyzed from the waist down, and speaks little to no English. He is a 69-year-old man who is at high risk due to the Covid-19 pandemic, so his top priority is safety. Once inside he has difficulty reading the plaques which display the information about exhibits. Since he is in a wheelchair, he has difficulty viewing the relics. He goes to an employee to ask for assistance, however she cannot understand him, and he cannot understand her. She points towards the multilingual posters for the app and he downloads it using the QR code on the poster.

The app auto detects his phone language and sets it to Russian so he can understand the language. Once in the app, it prompts him to point toward an artifact, he points towards the Tipu Sultan sword and information about the sword appears. At first, he had difficulty reading the information, by using the menu on the app he increased the font and learned a lot about the sword. He also accesses information on how historians believed the sword was used. He was able to access this information in many formats, such as a YouTube video, Wikipedia page, or a 3D model. Once he had finished looking at the sword, he is greeted with a menu that displays unvisited areas/artifacts. Allowing him to choose what he wants to see next. This helps him to view all the artifacts in the museum and once he had done so he leaves the museum feeling well informed and immersed in the world of the relics he had just seen.

Heuristic Evaluation 1 (Conducted by Amir Hussain)

Rule of Thumb	Is this rule being applied? How so?	Is this rule violated? How so?	How can this rule further improve usability, utility, and desirability?
1. Visibility of system status	The virtual map always shows where the user is. The time tour always demonstrates how much time is available clearly		
2. Match between system and the real world	Language consists of using generic icons such as the help being a '?', audio/video players using conventional controls, and the camera icon being generic as well.		
3. User control and freedom	A back key is implemented in most (all but time tour and ticket page) areas in case the user mis clicks	Ticket page does not allow for an escape if the wrong museum is picked.	The user should be able to get back to where he wishes easily if he has made a mistake.
4. Consistency and standards	Home, scan, and map are always available to the user to select.	The top left key is not always the same sometimes it is a menu other times it is a back key	Better consistency does not confuse the user
5. Error prevention		AR Scanning has no error prevention if they cannot scan the artifact properly	If they cannot scan, they cannot go forward
6. Recognition rather than recall	Help menus for timed tour and AR scanning help users who may be forgetful. Pictures of museum to help users identify issues	Timed tour exit is hidden away in a menu, it is not clear on how to exit without it.	Users being able to end the tour is an integral part of the tour. This leads to poor usability

7. Flexibility and efficiency of use	Users always have the options to switch between the most used functions (home, scan, and the map)		
8. Aesthetic and minimalist design	Help options readily available in multiple places. Icons used often to demonstrate functionality		
9. Help users recognize, diagnose, and recover from errors	Help menus available for AR scanning if the user cannot scan the AR		
10. Help and documentation	Help options are available in several locations if need be	Help options are missing in some locations specifically in related artifacts and have no indication on how to end the tour. And AR model does not show you can interact with the frame	Being lost in a new app is a common help button to guide the user will greatly increase usability.

Heuristic Evaluation 2(Conducted by Jason Chen)

Rule of Thumb	Is this rule being applied? How so?	Is this rule violated? How so?	How can this rule further improve usability, utility, and desirability?
1. Visibility of system status	- Time remaining on tour is displayed on the bottom of the screen. - Tickets page highlights the tickets chosen and displays the total on screen. - Top navigation bar indicates the user of the page they are currently in. - Live map highlights the user's visited location.	- Audio description does not display the title of the track the user is listening to.	- Users should know as much details as possible so they can use the product effectively.
2. Match between system and the real world	- Icons match the user's expectations (Back button goes back, and "?" button provides help).	- The icon for "Pay with Google pay" does not match.	- Icon should be the generic icon so as to not confuse the users.
3. User control and freedom	- Users can go back to the previous page through the back button whenever they want.	- The ticket purchase payment only has google pay as an option - "Sharing" panel only provides social media options but no local option like "save to device".	- Users will not be able to buy a ticket if they did not pay for a ticket. - Users will be able to have more freedom in the choice of sharing their photos.
4. Consistency and standards	- Help button is always top right, the back button is always top left. - The color scheme is consistent throughout all the panels.	- The help icon on the home screen looks like a button even though it is not interactable.	
5. Error prevention		- No dialogue box for confirmation when the user clicks "End tour" button	- Confirmation on actions that are not discreet ensures the user is not left wondering.

6. Recognition rather than recall	- Displays related contents for the user during video playback. - Provides popular social media options on the "Social Media Sharing" panel.		
7. Flexibility and efficiency of use	- Users can navigate to the three most frequently visited pages through the bottom navigation bar.		
8. Aesthetic and minimalist design	- Help screen only shows what is essential, never over explains.	- The highlighted area on the live map makes it look cheap.	- Looking at the map simply looks odd and is not pleasant to look at.
9. Help users recognize, diagnose, and recover from errors		- Does not display any error message.	- Error messages help users with issues they may come up with.
10. Help and documentation	- Multiple help icons are on the top right of the app, and they provide helpful guides for the users.	- No guide on how to interact with the 3D model. - No guide on how to end the timed tour.	- Users should be helped when dealing with out of the ordinary tasks.

Heuristic Evaluation 3(Conducted by Bhavan Pahuja)

Rule of Thumb	Is this rule being applied? How so?	Is this rule violated? How so?	How can this rule further improve usability, utility, and desirability?
1. Visibility of system status	- The "Buy Tickets" page highlights the user's current selection. - Scanning reticles on screen to teach users how to properly scan a display item. - Live map keeps the user updated of their current location and marks sections already visited. - Status bar displaying the length of audio/video. - Clock showing time left on tour.	- No prompt for users to notify them of successful ticket purchase.	- Makes users more aware of their ticket selection. - Makes it easy for a new user to learn how to scan an item. - Makes the user aware of their current location and helps them save time and avoid confusion. - Users might be on a time constraint which makes the timer more desirable.
2. Match between system and the real world	- Lets the user choose a museum by displaying name and image, followed by buying tickets or taking a tour just like in a physical setting. - Live map updates in real time. - Shows expected social media platforms when sharing. - Audio/Videos work in a similar fashion to existing apps.	- Users might not realize to swipe to look at related items (A next button might be better).	- Since this is a new app, it is important for the user to feel familiar with the system. Moreover, most people might not be familiar with AR which is why it's important that we avoid using system-specific terms.

3. User control and freedom	- Back button on most screens. - Option to go to the app home screen, scan an item or look at the live map always available.	- No back button on tickets page. - End tour button hidden. - No prompt for users when ending a tour. - Users should be able to take and share pictures with a display without having to place the 3D Model onto a flat surface.	-This is useful since it allows the user to achieve their objective and avoid frustration.
4. Consistency and standards	- Same font/style of buttons. - Similar color scheme throughout the app. - Static navigation bar.	- Timed tour prompts the user to choose end time but the clock suggests that they are choosing both the start and end time. - Some images might be cut due to rounded corners. - Different text sizes and punctuation between “Tickets Page” and “Tickets Page 3”. -Text on some buttons (Videos and Pay with google pay) is inconsistent and looks off-centre.	- It is important for any app to be consistent in its design. This makes the app more usable and desirable. The user is less likely to use an app with varying fonts/styles. The user should be able to easily figure out the functioning of the app. - It is also wise to follow platform conventions since the user is used to them.
5. Error prevention	- The scanning reticle and text to make sure users can scan the item correctly. - A map pointer to show current location to avoid confusion.	- The reticle should be more compact.	- Errors discourage a user from using an application so it’s always wise to do our best to prevent them.

6. Recognition rather than recall	- Text on screen to guide users through the task. - Help buttons on most screens to help users with unfamiliar tasks.	- Users might not know what “Place 3D Model” means.	- It is important that the user be able to perform tasks smoothly. If they are not familiar with the system (like in this case), it is important that they are prompted with help when needed. This leads to faster learning and can avoid user frustration.
7. Flexibility and efficiency of use	- The scan button lets the user quickly scan an item without having to take a tour. - The user can use the live map even if they are not on a tour.		- Making the app more flexible makes it easier for both new and veteran users to enjoy the experience. It also reduces the number of steps a user must take to achieve a specific task (say scanning for example).
8. Aesthetic and minimalist design	- Users can choose to scan an item or look at a live map no matter where they are in the app. - Home screen only shows museum image and name alongside options to take tour or buy tickets. - Interactive buttons display information about specific parts of the display.	- Text on the AR Scanning screen is distracting. - Duplicate information on scanning help screens. - Buttons look outdated. - Color scheme is unpleasant to look at. - Mixture of rounded and flat icons and design.	- The look and feel of a system are very important since it can attract or repel users. It is important for a user to be able to perform their tasks but also not feel overwhelmed by what they are looking at. In our case, we want the user to be able to enjoy the fun of AR without feeling overwhelmed by new technology.
9. Help users recognize, diagnose, and recover from errors	- Text and overlay are displayed on screen to show users where to place items to scan.	- No error to let the user know if a scan fails and how to fix it.	- If a user is not able to recognize and recover from their errors in a relatively new system like ours, they will lean on the side of not using it. It makes a new technology much easier to use.

10. Help and documentation	- The help button on top of the screen displays information relevant to the task.	- Help button missing in a lot of screens.	- If a user ever gets stuck, it is important that they can access the documentation that'll help them get out of the situation. This can prove to provide a lot of utility to the user.

Heuristic Evaluation Review Report 1 (Conducted by Alex Stark)

Heuristics Evaluation of AR Museum App

By Alex Stark **Date** 11/20/20

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1. Visibility of system status

Evaluation
It was found that some screens are missing title information when playing media. I give this a severity rating of 1 because it would not cause too much confusion for the reader.
It was also found that there is no indication when purchasing a ticket if the purchase completed successfully

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2. Match between system and the real world

Evaluation
It was found that the "Google Pay" buttons are not consistent with other apps that have this feature. I give this a severity rating of 1 because the button does have a complete description of what it does so it would not cause too much confusion.

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3. User control and freedom

Evaluation
It was found that most pages give the user the ability to back out of an unwanted state, but the option does not exist on the "Buy Tickets" page. I give this problem a severity rating of 4 because if a user found themselves in this state by mistake, they would need to restart the app to get out of it.

Another problem is that there is no option to pay for tickets with anything but “Google Pay”. I give this problem a severity rating of 3 because it can prevent many users from being able to use this feature of the app.
There is also no option in the sharing screen to save a local copy. I give this problem a severity rating of 2 because it would be frustrating for a user to have to share to social media and then download from social media to their device, but it is not a major feature of the app.

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4. Consistency and standards

Evaluation
It was found that the button in the top left corner of the screen is not consistent. In some cases it opens a menu, while in others it is a “back” button. I give this problem a severity rating of 2 because it can cause confusion and irritation, but it is easy for the user to undo the error and complete the task that they were originally trying to accomplish.
There was also one screen that has an icon that looks like a help button but is not clickable. I give this problem a severity rating of 2 because it can cause confusion and irritation, but is not related to a major feature of the app.

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5. Error prevention

Evaluation
It was found that there is nothing preventing user errors when trying to scan an artifact. I give this problem a severity rating of 3 because it can cause confusion and irritation and inexperienced users may not be able to find a way around the problem, as well as this problem having to do with one of the key features of the app.
There is also no confirmation box when ending a timed tour. I give this problem a severity rating of 2 because it can cause a lot of frustration if the user accidentally ends a tour prematurely, but due to the fact that the option to end a tour is hidden in a menu, this problem is not likely to occur frequently.

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6. Recognition rather than recall

Evaluation
It was found that the ability to exit a timed tour may be difficult for users due to the option being hidden in a menu. I give this problem a severity rating of 2 because it can cause confusion and irritation, but most users would think to look in a menu screen if they are searching for a button that they cannot find.

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7. Flexibility and efficiency of use

Evaluation
It was found that the most common actions have quick access buttons and that there are no accelerators needed to cater to experienced users.

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8. Aesthetic and minimalist design

Evaluation
It was found that the highlighted areas of the map do not look good and could take away from the overall aesthetic of the app. I give this problem a severity rating of 1 as it is purely a cosmetic issue with no effect on the functionality of the app.

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9. Help users recognize, diagnose, and recover from errors

Evaluation

It has been found that no error messages are displayed. I give this problem a severity rating of 3 because allowing users to diagnose any error that they encounter so they know how to fix and/or avoid the error is a critical part of any technology.

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10. Help and documentation

Evaluation
It was found that some screens are missing a help button, and some features are never mentioned and might never be found by the user. I give this problem a severity rating of 2 because it can cause some minor confusion, but does not have a large impact on the overall usability of the app. This problem can be solved simply by adding help buttons to screens that don't have them and mentioning all features of a screen in the help info for that screen.

Heuristic Evaluation Review Report 2 (Conducted by Israa Farouk)

Problem	Severity Rating	Justification for Rating
Ticket page does not allow for an escape if the wrong museum is picked.	4 - usability catastrophe; must fix	This problem could lead to the user having to close the app and reopening just to undo an action.
The top left key is not always the same sometimes it is a menu other times it is a back key	2 - minor usability problem	This problem requires more attention from the user to pay attention to what they are clicking on rather than relying on prior knowledge.
AR Scanning has no error prevention if they cannot scan the artifact properly	4 - usability catastrophe; must fix	This problem could cause a user to stop using the app out of frustration of not knowing what they are doing wrong and why they are unable to progress

Timed tour exit is hidden away in a menu, it is not clear on how to exit without it.	3 -major usability problem; important to fix	This problem could cause a user to get stuck in the app or spend an unsuitable amount of time trying to exit the time tour.
Help options are missing in some locations specifically in the “Related Artifacts” screen has no indication on how to end the tour. And AR model does not show you can interact with the frame	2 - minor usability problem	This problem may not be encountered often and so may go unnoticed, however it should still be fixed.
Audio description does not display the title of the track the user is listening to	0 - Doesn’t seem to be a usability problem	This problem may not arise as users may not care to know the title of the audio track they are listening to.
The icon for “Pay with Google pay” does not match.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Only has google pay as an option	3 - major usability problem; important to fix	Not having more than one option to pay could cause some users to be unable to purchase tickets.
The help icon on the home screen looks like a button even though it is not interactable.	3 - major usability problem; important to fix	Users may click on it expecting help and become frustrated upon receiving none
No dialogue box for confirmation when the user clicks “End tour” button	2- minor usability problem	Users may have accidentally clicked on the button and would then have to start the tour again as a result.
“Sharing” panel only provides social media options but no local option like “save to device”.	2 - minor usability problem	Users that do not want to share or do not have social media have no way of saving their pictures.

The highlighted area on the live map makes it look cheap.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Does not display any error message.	3 - major usability problem; important to fix	Users may get frustrated and stuck in the app as a result of this problem.
No guide on how to interact with the 3D model.	3 - major usability problem; important to fix	Users may get frustrated and stuck in the app as a result of this problem.
No guide on how to end the timed tour.	3 -major usability problem; important to fix	Users may get frustrated and stuck in the app as a result of this problem.
No prompt for users to notify them of successful ticket purchase.	3 -major usability problem; important to fix	Users may repeat action if they think the purchase was not made.
Users might not know what “Place 3D Model” means.	2- minor usability problem	Some users may need more descriptive instructions to perform the task.
User might not realize to swipe to look at related items	2- minor usability problem	Some users may be able to figure out that swiping shows them related items faster than other users, this could lead to the feature being undiscovered.
No back button on tickets page.	4 - usability catastrophe; must fix	This problem could lead to the user having to close the app and reopening just to undo an action.
Timed tour prompts the user to choose end time but the clock suggests that they are choosing both.	2- minor usability problem	This problem may lead to confusion in some users. It may cause them to repeat actions or enter data incorrectly.
Some images might be cut due to rounded corners.	1 - cosmetic problem	This problem is just a minor visual

		inconvenience to the user.
Different text sizes and punctuation between “Tickets Page” and “Tickets Page 3”.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Text on some buttons (Videos and Pay with google pay) is inconsistent and looks off-centre.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Guide square should be more compact.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Users should be able to take and share pictures with a display without having to place the 3D Model onto a flat surface.	2- minor usability problem	This problem may cause some users to be unable to take a picture with the model.
Text on the AR Scanning screen is distracting.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Duplicate information on the scanning help screen.	2 - minor usability problem	This inconveniences the user slightly by making them read duplicated information
Buttons look outdated.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Color scheme is unpleasant to look at.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.
Mixture of rounded and flat icons and design.	1 - cosmetic problem	This problem is just a minor visual inconvenience to the user.