Artribe

Augmented reality exhibition network

Sevde Kayaoğlu

Visual Communication Design Department,
Faculty of Communication, Istanbul Bilgi University,
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1. ABSTRACT

The exhibition models of traditional presentation spaces are not fundamentally appropriate for new media art's interactive and contextual nature. This project aims to eliminate the constraints of the traditional exhibition format faced by new media art creators, to give its users the freedom to exhibit individually or in collaboration and to explore artworks in various mediums through a social network.

As a result Artribe provides an augmented reality gallery spread on public spaces across the world, easily accessible via smartphones. While democratizing the curation of art, it forms a social network to build the community of new media designers and artists. Furthermore, it helps them to take advantage of the power of augmented reality to create more interactive, enhanced, and participative experiences for the viewer.

In order to create online art exhibitions, Artribe aims to design and develop a social network which has capable augmented reality and brings into it our smartphone with an easy-to-use interface that specifically to meets the needs of new media artists.

2. KEYWORDS

traditional exhibition format, new media art, various mediums, augmented reality, public art, interactive experience, participative art, collaborative art, enhanced media

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4. PERSONAL MOTIVATION

New media art becomes a very popular and developing subject. But as new media designers and artists, we aren't able to showcase our works in most exhibition spaces as a result of the cultural phenomenon of the conventional exhibition format. With the expansion of augmented reality technologies, their usage increased in also the art world, especially new media art. Today, we can find newly developed augmented or mixed reality art experiences in any field. Nevertheless, when considering these technologies' abilities, It is quite surprising their current usage in art exhibitions is insufficient. In conclusion, what is apparent is that the virtual art is being developed very fast, but their current way of use is not appropriate or enough for new media art exhibitions.

As a designer who constantly follows up-to-date technologies, I want to work with augmented reality technology to problem-solving. Because, taking advantage of this technology, I can produce solutions that are not possible before. The question “What if we can get rid of constraints around new media art exhibitions through an AR-based mobile exhibition application.” came as a result of this problem and kickstarted Artribe.

Therewithal, it is challenging because of that Artribe is my first Augmented Reality related project. However, this challenge can improve me in many aspects and contribute to existing my skillset. Before I started working on Artribe, I designed and developed mobile applications, interactive web experiences, and many other projects.

5. INTRODUCTION

5.1. Problem Statement

Today's rapidly evolving digital realities also affect the art world.[1] Audiences have been adapting to the new online culture that allows them to participate and interact with the art content they consume. This online culture allows people all over the world to choose what art content they want to consume.[2] However, existing online platforms cannot meet the needs of the new media art, especially in terms of the exhibition format. In the cultural environment, this situation has restrictive effects on artists as well as art consumers.

> *Traditional presentation spaces create exhibition models that are not particularly appropriate for new media art. The white cube creates a "sacred" space and a blank slate for contemplating objects. Most new media is inherently performative and contextual.*
> *- Christiane Paul[3]*

With the expansion of virtual and mixed realities, the usage of virtual art becomes as important as experience with real objects. New technologies such as virtual reality and augmented reality play a major role in this. There is a gradual increase in the application of AR technology in new media art creation. As online users, creators can present themselves to the world using this modern technology in the cultural environment. As designers and artists create artwork that includes multiple audiovisual elements, such as 2D and 3D images, videos, and animations, viewers can enjoy synchronized interaction with the virtual assets in reality settings through mobile devices.

The research around the constraints of new media art creators and consumers in the new online culture is based on the idea of finding better ways for new media exhibitions and developing new opportunities with existing and upcoming technology.

5.2. Definitions & Related Work

5.2.1. Art World

First we need to define the idea of the art world, because it is ambiguous and uncertain in general. Martin Irvine a professor in the Georgetown university and founder of Irvine Contemporary art gallery, defines the art world as:

> *The primary function of the art world is continually to define, validate, and maintain the cultural category of art, and to produce the consent of the entire society in the legitimacy of the art world's authority to do so.*

- *The art world is thus part of our system of professions, and many parts of the art world network are now highly professionalized and careerist.*
- *As in all institutions as interdependent networks, you don't need to know you are participating in the art world to be carrying out its primary cultural function.*[4]

The art world was considered as closed structure which had authority over art issues, especially before the internet and social media. Despite the multiple actors working, there was still a clear hierarchy and system at top of the art world.

5.2.2. New Media Art

American critics Mark Tribe and Reena Jana wrote a book entitled New Media Art. *"We use the term New Media art to describe projects that make use of emerging media technologies and are concerned with the cultural, political and aesthetics possibilities of these tools"*[5], they write in the introduction. New media art is often distinguished as time-based or real-time, dynamic, participatory, collaborative, process-oriented, modular, variable, generative and customizable.[6]

Of course, this departure from the traditional understanding of art comes hand in hand with also a deviation from the ongoing curation and exhibition practices. As new media in itself progresses on a level never seen before, its implications on the relationships between different sections of the art world; starting from the relationship between the creator, the curatorial space, and the audience strengthen accordingly. Thus, this change in relationship, especially when coupled with the fact that the popularity of social media and digital space usage within this area of work increases, the necessity for a more comprehensive exhibition space - both on a social and material level - has become apperant.[7]

5.2.3. Social Media

Web 2.0[8] caused a major change in both real life and online world. People were given the tools to create, share, comment and interact with the content online. The lines between the expert and the amateur, producer and consumer, between the individual and the institution, and the notions between high and low culture start to blur with the process of convergence happening in the media world.[9] Many academics in the field of new media, like Jenkins[9], Benkler[10] or Shirky[11], have been optimistic about the democratization of society by new social media tools. The amateur's voice has been amplified by social media. With the help of social media, even some amateurs have been able to elevate themselves to the status of an expert in a given field.[12]

> *The main advantage of any new technology is that it amplifies human potential.*
> *- Bill Gates[13]*

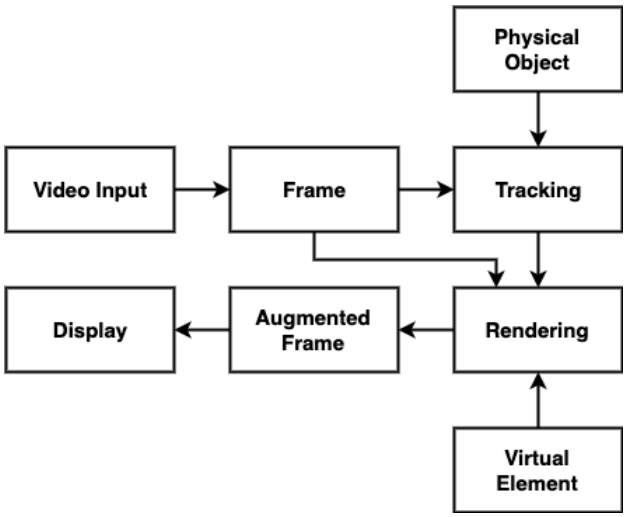
It is the clear truth of modern times that social media has given creators around the world the power to both directly connect to their audience on an interpersonal level and create various business options based on that very relationship.[14] As the digital world brings people closer, it also enables creators that exist within its borders to have an appreciation for their work without the hierarchical implications of nepotistic ways of the traditional art and gallery culture.

In the last years, two popular social media applications, Snapchat[15] and Instagram[16], have integrated augmented reality into their platforms. This has shown to have a major impact on the general public, which is not a demographic specifically interested in the field of AR, when it comes to their rising awareness on the issue.

f1. *World lenses feature of Snapchat*

5.2.4. Augmented Reality

The term Augmented Reality (shortly AR) is defined as *"A field in which 3D virtual objects are integrated into a 3-D real environment in real time."*[17] The conceptual strategy of AR is to superimpose a virtual (computer-generated) layer on the natural visual field, that appear to coexist in the same space as the real world. [18] By mixing the real and the virtual, AR makes the imaginary objects visible and "feelable" in its spatial depth of the environment.



f2. *Basic Augmented Reality System*

The first augmented reality system experimentation is created by Ivan Sutherland[19] in 1968. It accompanies an optical see-through head-mounted display and is tracked by mechanical and ultrasonic trackers. Only simple drawings could be displayed in this system because of the very limited processing power of computers at that time.

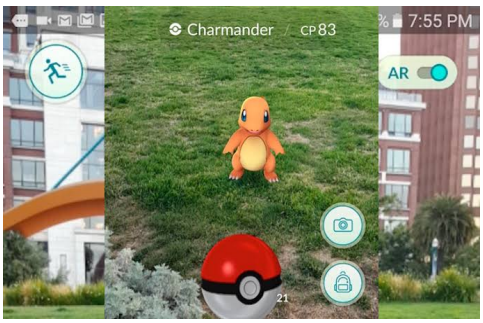
The paper, *The History of Mobile Augmented Reality* [20] summarizes the evolution of AR. In early experiments, algorithms calculated on an external machine, but today, smart-phones has all the processing power needed to calculate AR algorithms. Therefore all process can be done on the same device. Today such a system can be built with different systems like ARKit by Apple[21], ARCore[22] by Google, or Vuforia by PTC[23]. These systems combines camera scene capture, device motion tracking, advanced scene processing, and display conveniences to simplify the task of building an AR experience. While ARKit (for iOS) and ARCore (for Android OS) are fundamental frameworks to native device functions for their individual operating systems, Vuforia is a SDK, built on top of these frameworks and it can be used with todays most popular mobile operating systems: iOS, Android and Windows Mobile. This platform enables to

track normal images, so that many objects can be used as a tracking marker. Layar[24] is a mobile AR browser application that is very popular in early 2010s. Although it came to the end of its product lifetime, while operating it enabled browsing through real spaces. Users could generate virtual content layers that can be superimposed on markers, magazine pages or other images. Another user could later use Layar browser to view these virtual contents. Artivive[25] is an AR tool for artists, that uses the similar marker based technology like Vuforia or Layar. Artivive allows artists to add an extra layer of digital art upon their classical artworks by using the existing artwork as a marker.

5.2.5. Location Tracking & Global Positioning System

The Global Positioning System (GPS, official name "NAVSTAR-GPS"), became operational in December 1993. It was launched as a military service originally, but now millions of people use it for purposes like navigation, geo-caching or AR.[20] GPS receiver calculates its position by timing the signal sent by multiple satellites. The average accuracy of the GPS receiver in todays mobile phones, is in the range of 15 meter.

A good example of combining AR and location tracking is the phone game Pokemon Go[26] which is developed by Niantic Labs, while combining the GPS location data and the augmented reality, superimposes characters from the cult anime of 1990's onto the user's surroundings. The goal of the game is to go around different locations for finding virtual characters in real world and catch them.



f3. *A snapshot from Pokemon Go[26]*

In conclusion, based on the previously presented related works and researches, the suggestion that both the connective fields AR, social media, and location tracking as a mainframe for the application build; and their developmental implementations within the mixed media spaces are for the better becomes apparent. Following this train of thought, it can be claimed that an application

based on these parameters can be used in bettering and widening both the creator and the spectator experiences in modern art spaces, specifically under the context of mixed media creations. Artribe is developed based on all of these fields.

5.3. Competitive Analysis

Today, although the number is still on a much more smaller scale when compared to other similar VR technologies focused on other social and media-based discussions, some examples of art and exhibition based AR technologies can be found. Among these, three - Artivive[25], Art Projector[27], Apple [AR]T[28] are found to be the most comparable ones to the design project at hand by the creator.

With the mentioned projects Art Projector and Apple [AR]T, a primary problem is enhancing the constraints of the experience seems to be their offering of a one-time experience for the user. Also, another reason is that these art exhibitions created by curators, and do not allow the users to exhibit their artworks. This is considered as a probable reason for the decline in usage frequency, as well as the amount of progressive user curiosity and interaction as a direct result of the said frequency. Considering Art Projector and Apple [AR]T, Artivive may be a better solution. But, another limiting factor is emerging for users because of its marker-based running structure. The lack of collaborative work options in their settings is also thought to be a direct opposition to the nature of media and art design as a whole, especially in the case of mixed-media creations where the number of collaborations between various fields is consistently on the rise.

Since Artribe, the proposed project, offers itself as not only an interactive media AR experience but also a social network where creators and spectators alike can connect under the premise of following, it gives its users the chance to build interpersonal relationships with existing/future contents; therefore also giving them the option to consume the wide range of content under their personal taste selections. Along with these implantations, because it provides an experience that is compatible with the way users are already familiar with social media usage, they are likely to have a higher frequency of use than existing apps. (See Appendix 3 for competitive analysis table and Appendix 4 for SWOT analysis)

6. CONCEPT DEVELOPMENT

The project started with the question "How can we get rid of the difficulties of accessing the exhibition spaces and the obstacles preventing the up and coming designers & artists to exhibit their works of art?" As a result of the research, both academic articles and books, as well as interviews with potential target audience designers and artists, led the project to new media art. This question has changed as “How can we eliminate the constraints of the traditional exhibition format for new media art?” in line with the needs of the possible target audience and result of initial research. As a result of that the problems related to the exhibition mostly affected the new media artists producing digital works, it helped to determine the target audience.

All the researches have brought the project to the knowledge that virtual reality and augmented reality technologies are frequently used in solving the problems of the target audience. In order to understand the weaknesses and pros of these technologies in problem solving, comparative research was completed by addressing similar existing mobile applications.

In conclusion, based on background research the design project has three basic proposed principles:

- As with art galleries themselves, the project should make use of the existing physical environment and create a personal experience; but at the same time, it should be free of the limitations that are present in the conventional exhibition format.
- Using the spatial capabilities of the AR technology, the project should offer an interactive environment that has the ability to present artworks in various mediums, in this way the experience doesn't be restricted within the borders of a screen.
- The final product should be accessible as possible and easy-to-use. The user-friendly approach helps to make audiences a part of the experience.

6.1. Project Structure

6.1.1. Architecture

Registration & Login

A user first needs to create a profile on the Artribe platform. Social login mechanisms could be used at this time to accelerate the process. If the user has not opted for social login, they need to provide some profile information like email, username, full name, and profile photo. After the account creation user automatically login to their account and access the home page of the app. When the user wants to log in with another device, they can log in with classical username and password combination or they can use social login for passwordless entry.

Home Page & Exhibition View

On the homepage, users can view the recent exhibitions list of followed users. When they tap on an exhibition card, they access the exhibition detail page which accompanies all detailed information about the exhibition, such as creator, contributors, description, exact location on the map, tags, and categories. Also, the exhibition details page is the place that users can start the AR experience. To start, first, they view the visual clue to find, and then they are directed to the AR view.

User Profiles & Follow Mechanism

All profiles and all published exhibitions are publicly viewable by other users. A user can still follow other users to get notified about their new or nearby exhibitions. The following mechanism also shapes the arrangement of works on the home screen.

A user profile consists of general information about the user and its exhibitions. On this page you can follow and unfollow the user. Exhibition card directs to the exhibition detail page the same as above. Users can also see detailed analytics of their exhibitions and profiles.

Exhibition Creation

For creating an exhibition, it is required to starting with upload an artwork. This can be an image or video from the camera roll or a 3D model from file manager. When the upload process completed, the user is directed to AR View to scan the surrounding environment and place the artwork inside. Artworks can be placed on detected horizontal and vertical planes as well as any tracking point on the world. After initial placement, the user can fine-tune the position and size of the artwork. If wanted, any additional artworks can be added to the

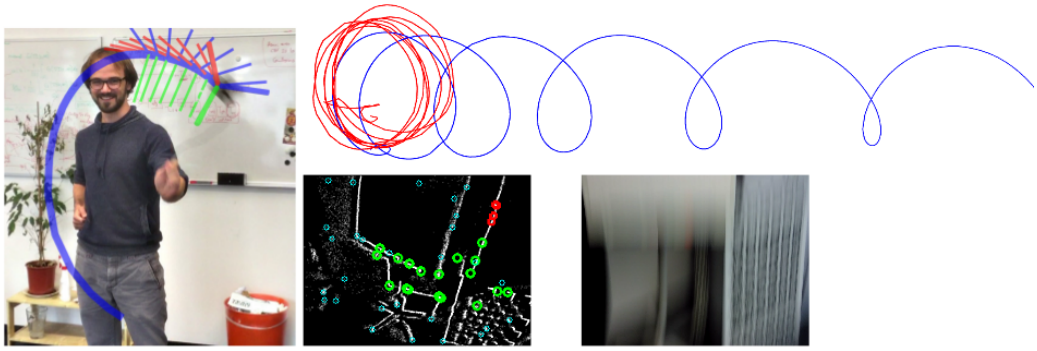
scene via "add more" button located in the corner of the screen. This button prompts another file upload dialog and then returns to the AR view again for the placement procedure. When all placement is done, the user taps on the continue button to input necessary information about artworks, confirm and fine-tune GPS location on the map, and give exhibition details, add contributors if applicable. Then confirms the information that they give and publishes the exhibition on their profile.

6.1.2. AR View Design & Technical Implementation

As iOS is determined as the first platform for Artribe, ARKit[21] is the first choice AR framework.

In order to overcome the limitations of marker-based AR, markerless AR was proposed. To find camera pose, natural features such as color, shape, texture, etc are used. This type of AR is called as world-tracking.

Visual-inertial odometry is the method that world tracking AR sessions are using. Motion sensor data and computer vision analysis of camera input combined in this process to track the device's orientation and position in real-world 3D space, which is also known as camera pose.[29]

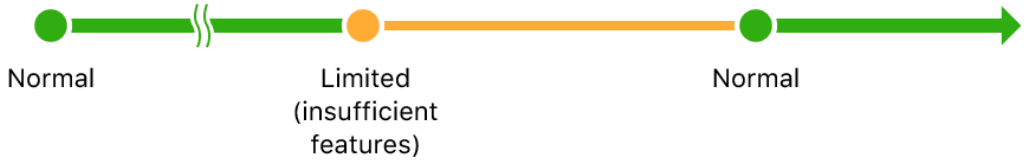


f4. *Real-time Visual-Inertial Odometry[30]*

When you start an AR session, ARKit needs some time to collect enough data for the precise calculation of the camera pose. Consistent sensor data and camera input with recognizable features or visual complexity is needed for best results. Therefore world-tracking quality can be affected by these conditions during a session.

f5. *AR Session Lifecycle*

Even with these minor issues, markerless AR is still the best choice for Artribe's goals and these problems could be minimized with design decisions. When the user starts the AR session, firstly a message that gives information about moving the camera for starting tracking is displayed. Then tracking points could be shown to the user for indicating the visual complexity of the environment. At any time, a session can enter a limited tracking state, based on changes in the user's local environment. For example, if the user points the device at a blank wall, or the lights in the room go out, tracking quality may be reduced. When this situation occurs, Artribe will provide feedback that guides the user in resolving the situation so that the tracking state can return to normal.



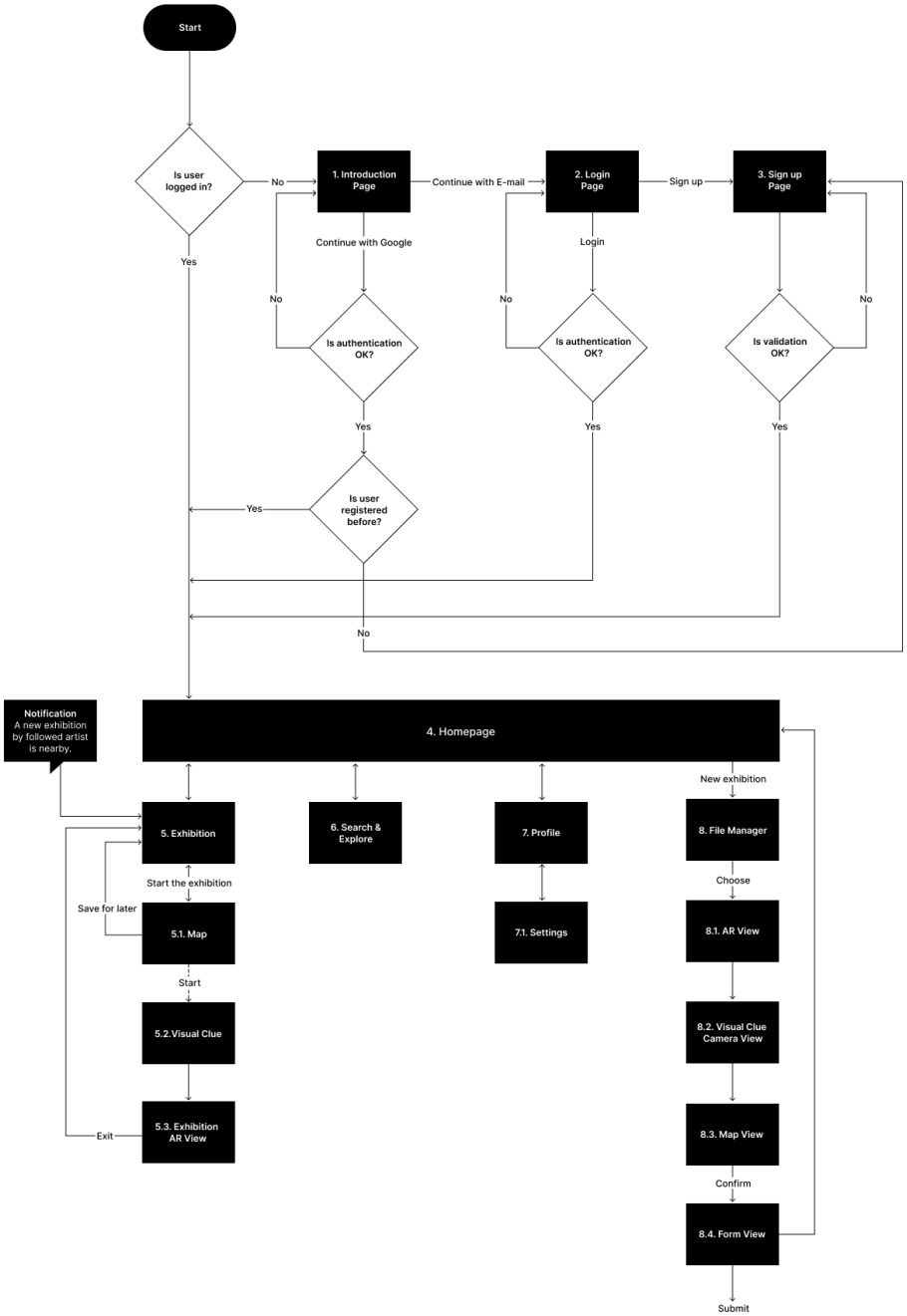
f6. *AR Session With Tracking Quality Changes*

When creating an exhibition in Artribe, world-tracking data with anchored artworks is saved and pushed to the server. This data is named as AR World Map. ARKit uses that method to relocalize AR tracking data even after the app is closed and relaunched. When a user starts an AR Exhibition View, Artribe downloads AR World Map that created on the exhibitor device and uses the same method to relocalize it on the viewers' devices.

The reliability of using AR World Map to regenerate an AR exhibition session depends on the real-world environments. For example, it's easy to relocalize to a map recorded indoors under consistent artificial lighting. But it's less likely to succeed when features of the local environment and physical objects in the scene change over time. Therefore exhibition creators will be warned about they need to select locations that visual features less likely to change over time. On the viewer side, for successful relocalization, the camera needs to see areas of the local environment that it passed through while creator generating the map. To assist successful relocalization, a screenshot or photograph of the AR

World Map area will be saved as a visual clue by creators. While viewers searching this camera frame, ARKit automatically places AR World Map to their physical environment.

6.1.3. User Flows & Specifications



- Starting point

1. Introduction
- Slider for the introduction of the application
- Button “Continue with Google”
- Button “Continue with E-mail” navigates to Login Screen

2. Login
- Form for login credentials
- Links to Sign up, Terms and Conditions and Privacy Policy
- Error message for invalid credentials

3. Sign up
- Form for e-mail, password, and username
- A confirmation mail will be sent
- Links to Login, Terms and Conditions and Privacy Policy
- After sign up

4. Homepage
- List of recent exhibitions with links to exhibition detail
- Tabs for Search & Explore, New Exhibition, Notifications, Profile

5. Exhibition
- Exhibition title
- Username
- Location
- Exhibition cover image
- View and like count
- Like button
- More button with Share and Report options
- Exhibition date
- Description
- Tags
- Button for Map

5.1. Map
- Map with markers of exhibition and viewer location
- The map shows the direction from the current location to exhibition location
- Shows distance and the estimated duration
- “Save for later” button

- “Start” button only available when the viewer is close enough to the exhibition

5.2. Visual Clue
- Visual clue image
- “Locate” button

5.3. Exhibition AR View
- Camera with AR overlay
- “info” button for tips

6. Search & Explore
- Search bar with input
- Explore tabs for Top and Nearest exhibitions
- After searching explore tabs will replace with search result tabs (Works, Accounts, Places, Tags)

7. Profile
- Profile picture
- Username
- Full name
- Exhibition, followers and following tabs
- Button for saved exhibitions
- Button for settings
- List of exhibitions with links to exhibition detail

7.1. Settings
- Profile edit
- Account settings
- Notification
- About
- Help
- Log out

8. File Manager
- “Choose from photo library” button
- “Choose from documents” button

8.1. AR View
- Progress bar for the required complexity level

- Tap on the screen to place the object
- “info” button for tips
- Continue “button”

8.2. Visual Clue Camera View

- Camera view with the button for taking a photo
- “Retake” and “Next” button

8.3. Map View

- Map with a draggable marker for exhibition location
- “Confirm” button

8.4 Form View

- Cover preview area
- Input for Exhibition name
- Input for Exhibition description
- Input for Tags
- Switch for “contains adult content”
- “Exhibit” button

6.1.4. Elements of the Visual Design

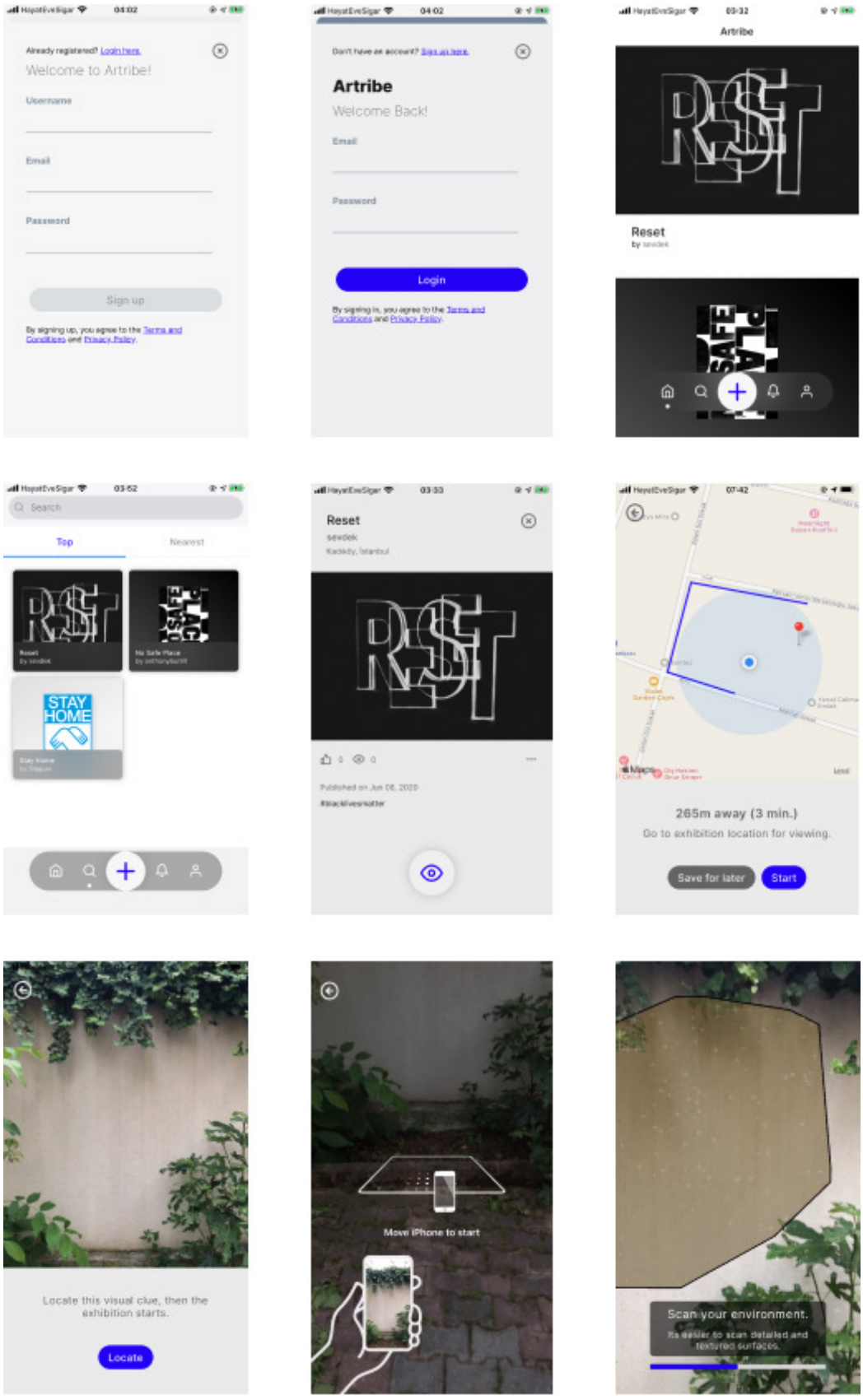
This mobile app will be used on the go, almost all decisions should be taken with considering that: limitations related to the screen size, glare because of the sun, possible visual impairments of some users, various screen quality of smartphones, etc.

The font should be chosen to maintain readability and legibility at an optimum level. It is necessary to decide how many different weights of this font(s) will be used and what is the minimum font size. There are already some recommended fonts that suitable using in mobile applications. But, it's necessary to take into account that systems recommend minimum font sizes considering their default fonts. Currently, Apple recommends setting the minimum size for body text to be 17pt in its Human Interface Guidelines.[31] It recommends for iOs fonts like San Francisco and New York. On the other hand, Google recommends setting the minimum size for body text to be 16sp (equal to 16pt in iOs) in Material Design[32] guidelines for Roboto font.

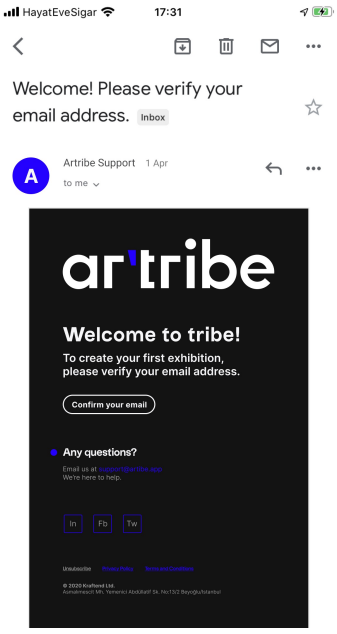
Inter[33] is a free and open-source typeface carefully crafted & designed for screens. Inter features a tall x-height to aid in the readability of mixed-case and lower-case text. Because of its features that well suited for mobile interface design, it has chosen as the main typeface of the application.

The preparator of Haines Gallery, Sean Brimer says, the purpose behind painting the walls white "that allows the attention to be on the work".[34] Rather than most used classic brilliant white in art galleries, the background color of the app decided as white which has a slight hint of grey. This "non-gloss white" usage in the mobile application allows to directs all the audience's attention to the artworks. Typography will be used in black and gray tones to avoid losing font's legibility on the white background and also to create a natural effect. As an easily distinguishable color RGB blue was selected and used on buttons and call to actions, for directing users to specific actions.

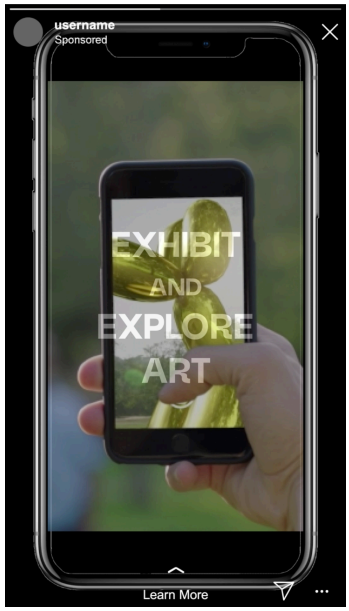
Also, all the graphical elements in the interface will be used for this purpose: the interface should be a tool for the link between the artist, the art and the audience, and should not contain any distractor element that interferes with this communication.



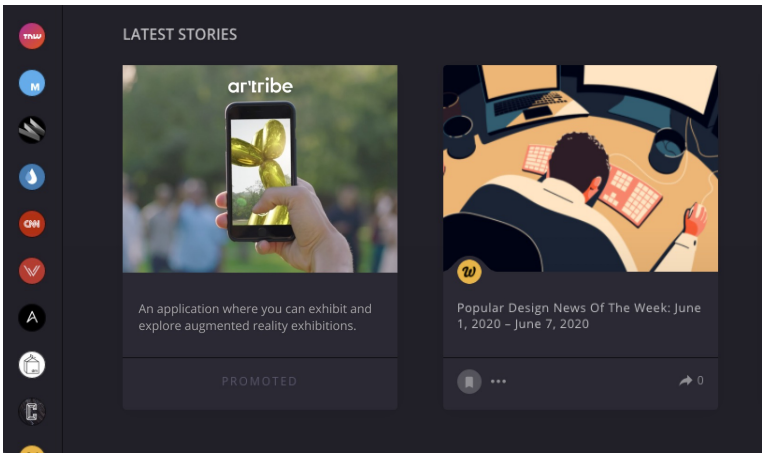
***f8** UI Designs*



f9 *Transactional Email*



f10 *Instagram Story Advertisement*



f11 *Muzli Extension Advertisement*

6.1.5. Server Implementation

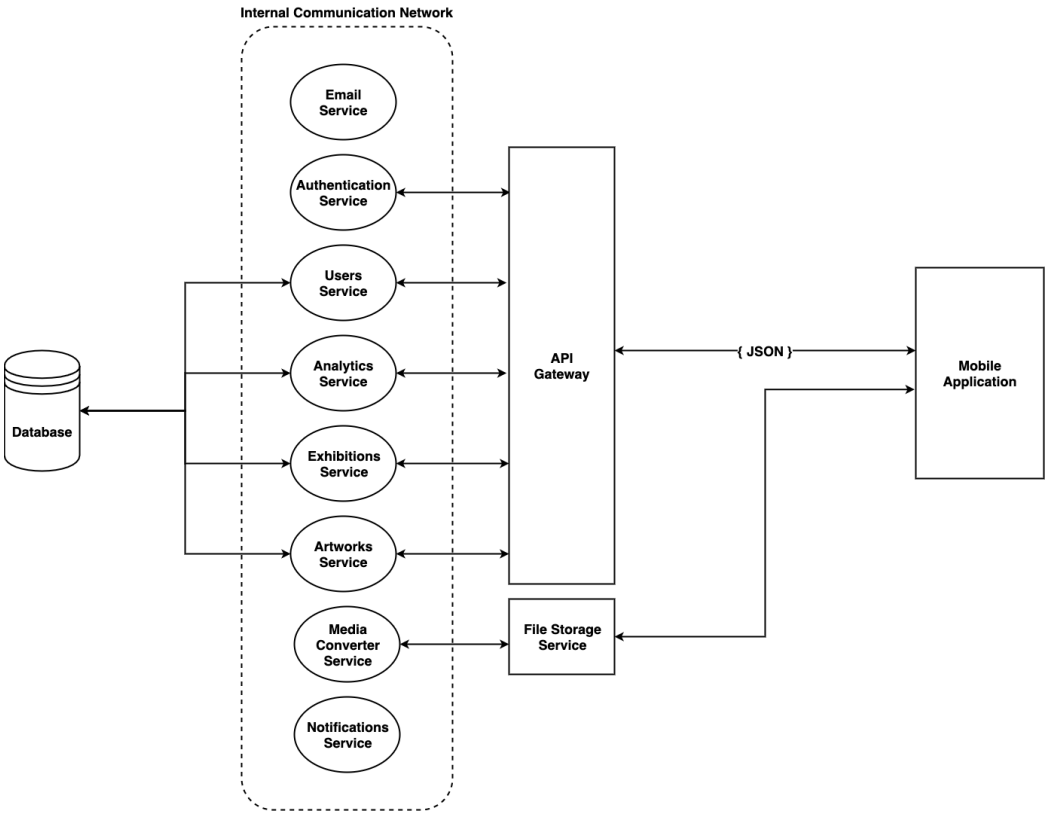
The Artribe server consists of multiple microservices. Microservice is an architectural style that structures an application as a collection of services that are:

- Highly maintainable and testable
- Loosely coupled
- Independently deployable
- Organized around business capabilities

Our microservices will be:

- Users
- Authentication
- Exhibitions
- Artworks
- File Storage
- Media Converter
- Notifications
- Emails
- Analytics
- API Gateway

Each of them has a specific job to handle. While they can all communicate with each other on the secure internal network, only required services access the database, and they could be accessed from outside only via API Gateway by authorized users. The mobile application communicates with API gateway via JSON[35] messages over HTTP[36], which is a very simple message structure used by nearly all modern APIs. The architecture of server communication should follow this schema:



f12. *Server Architecture and Communication*

6.2. Medium

The proposed medium for this project is a mobile application with augmented reality capabilities. The main reason for this is augmented reality keeps the real-world central, but enriches it with other digital layers. Thus, AR can help to bring the new media art out of white cube galleries and at the same time solve many problems: such as production costs, logistics-related obstacles, curation process, etc.

Through the AR technology Artribe creates a visual & auditory augmented reality exhibition with minimal equipment required for the user. Since there are no production processes, and logistic barriers, creators can easily present their work in any context. They can use multiple audiovisual elements like 2D&3D images, videos, animations, and sounds.

6.3. Audience & Language

Based on the given background research and competitive analysis, the expected target audience of the design project can be limited within the following demographical qualities. Specifics such as age can only be kept in expectation here, following the train of thought that mixed media and AR creations are usually created by young adults, though this generalization isn't limitive of the audience.

1. New media art creators and audiences
2. Internet Users
3. Smartphone users
4. Knowledgeable in basic English

Thus, both the visual and commanding language of the design project is expected to follow the main rules of many other social media applications; in that its basic command system suggests and easily accessible community-building practice.

Therefore two personas defined and user stories developed around them.

Maggie Art Critic, 45 Goals & Motivations Wants to discover more artists and reach them. Visiting more exhibitions without spending much time.

Jimmy Digital Sculptor, 35 Goals & Motivations Being able to present his work in real size and in its related environment. Eliminating 3D print proccess and costs.

6.4. Project Planning

Project is started at 16/09/2019. Estimated completion time for final proposal is 99 days, which is equivalent to 24/12/2019. All the tasks and timeline is calculated with Critical Path Method and available in Appendix 5, 6 & 7.

Overall project cost will be 104.321,27₺. Detailed cost table can be found at Appendix 8.

7. FUTURE PROJECTION

Future improvements can be made to the application and the experiences it offers. An application can be developed for Android devices to reach more users and expand their network.

In terms of improving interactivity in the exhibition experience, real-time data can be used. It is possible to use data coming from external sources, phone cameras & microphones, also the date, time, weather, etc.

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10. APPENDIX

10.1. Research Questions

- Traditional exhibition format in digital age
- The state of mixed media art in exhibition culture
- New media art exhibition issues
- Rethinking curation for new media art
- Interactive art examples and technologies
- The use of AR under the purpose of exhibitive art projects
- AR technology mechanisms and their mobile usage
- Affects of social media on art experience
- Social media and community culture

10.2. Research Methodology

During the background research and the problem definition of the design project, qualitative research was chosen to be the main methodology, based on the following reasons:

1. The problem itself, which concerns the use of AR and mixed media culture in relation to each other, is best observed using social researches and literary reference systems on an academic level.
2. Audience expectations, program capabilities, technological implementations, and competitive research are based on already existing research components and test results.

It should also be added that verbal target audience surveys and interviews were done in order to create limitations on the project's structural aims. During this process, user tests and tastes were taken into consideration in visual design decisions and flowchart build.

10.3. Competitive Research Table

	Artivive	Art Projector	Apple [AR]T	Artribe
Price	Free, Commercial	Free	Free	Free
Platform Support	iOS, Android	iOS, Android	iOS	iOS
Geo-Location	-	-	yes	yes
Marker Based Tracking	yes	-	-	-
Markerless Tracking	-	yes	yes	yes
Requires a Desktop App for Creators	yes	unknown	unknown	-
User Generated Content	yes	-	-	yes
Collaborative	-	-	-	yes
Image	yes	yes	yes	yes
Video	yes	-	yes	yes
Animations	yes	-	yes	yes
3D Objects	-	-	yes	yes
Sound	yes	-	yes	yes
Usage Tracking/Analytics	-	-	-	yes

10.4. SWOT Analysis

STRENGTHS	WEAKNESSES
• No marker needed for tracking. • Uses location and computer vision based world anchors. • Works completely on mobile. Doesn't need desktop app for creators. • It is possible to create individual or collaborative exhibitions. • Shows usage tracking/analytics.	• Artribe currently only works on iOS. It means the less possible user than competitors. • It is not funded by powerful companies like Apple or Google.
OPPORTUNITIES	**THREATS**
• By creating a location-based markerless exhibition, it creates a niche space for itself in art. • Because it uses social networks can spread quickly with the word of mouth effects.	• If Apple makes [AR]T Walk public, it could pose a threat to Artribe. • Artivive has a build-up the artist community. If it improves the application by incorporating new features that we are a strength, it becomes a strong competitor.

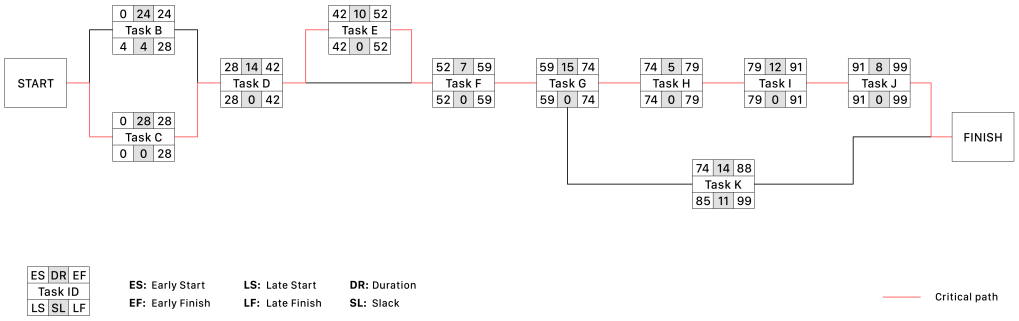
10.5. Development Schedule

Start Date	Finish Date	Days to Completion
16.09.2019	24.12.2019	99

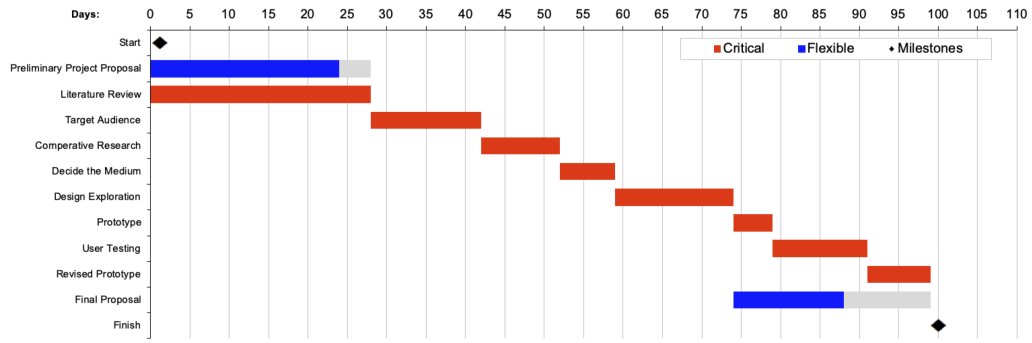
Critical tasks

Task ID	Task	Predecessors	O (min)	M (most likely)	P (max)	Duration (days)
A	Start					
B	Preliminary Project Proposal	A	20	24	28	24
C	Literature Review	A	22	28	34	28
D	Target Audience	B,C	13	14	15	14
E	Comparative Research	D	7	10	13	10
F	Medium Desicion	D,E	6	7	8	7
G	Design Exploration	F	13	15	17	15
H	Prototype	G	4	5	6	5
I	User Testing	H	10	12	14	12
J	Revised Prototype	I	7	8	9	8
K	Final Proposal	G	12	14	16	14
L	Finish	J,K				

10.6. Critical Path Method (CPM) Diagram



10.7. Project Timeline



10.8. Cost Table

Fall Semester	Spring Semester	Total Project Time
168 hours	224 hours	392 hours

Description	Unit Price (TL)	Amount (hour)	Total (TL)
Direct Costs			
Direct Labor	240,00	392	94.080,00
Direct Material	1.020,00	-	1.020,00
Indirect Costs			
Rent	7,50	392	2.940,00
Utilities	1,36	392	534,55
Equipment	3,41	392	1.336,72
Software Subsciptions	4,09	392	1.603,64
General Office Expenses	7,16	392	2.806,36
TOTAL			**104.321,27**

10.9. Pre-Test Form

Pre-Test Questionnaire

* Required

1. **Name** *

2. **Profession**

3. **Age** *

Mark only one oval.

- ◯ 15-20
- ◯ 21-30
- ◯ 31-40
- ◯ 41-50
- ◯ 51 or above

4. **Have you had any augmented reality experience?** *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Not sure

5. **Have you ever used the following social media platforms?** *

Check all that apply.

- ☐ Instagram
- ☐ Snapchat
- ☐ None

10.10. Post-Test Form

Please share your opinions about the product.

6. **What's most appealing about this product?**

7. **What do you like/dislike about the way it works?**

8. **What's the hardest part about using this product?**

9. **If you could change just one thing in this product, what would it be?**

10. **How do you think this product is going to help you?**

11. **Why do you think someone would use this product?**

12. **What's one thing we can add that would make this product indispensable for you?**

10.11. Post-Test Rating Form

Post-Test Questions

Please rate according to your experience.

* Required

1. **Was the interface easy to use?** *
   Mark only one oval.

	1	2	3	4	5	
Not easy at all	◯	◯	◯	◯	◯	Very easy

2. **Were the text sizes are legible?** *
   Mark only one oval.

	1	2	3	4	5	
Not legible at all	◯	◯	◯	◯	◯	Very legible

3. **Was the function of the buttons clear?** *
   Mark only one oval.

	1	2	3	4	5	
Not clear at all	◯	◯	◯	◯	◯	Very clear

4. **How likely is that you would use this product on daily basis?** *
   Mark only one oval.

	1	2	3	4	5	
Not at all likely	◯	◯	◯	◯	◯	Extremely likely

5. **How likely is it that you would recommend this product to someone?** *
   Mark only one oval.

	1	2	3	4	5	
Not at all likely	◯	◯	◯	◯	◯	Extremely likely

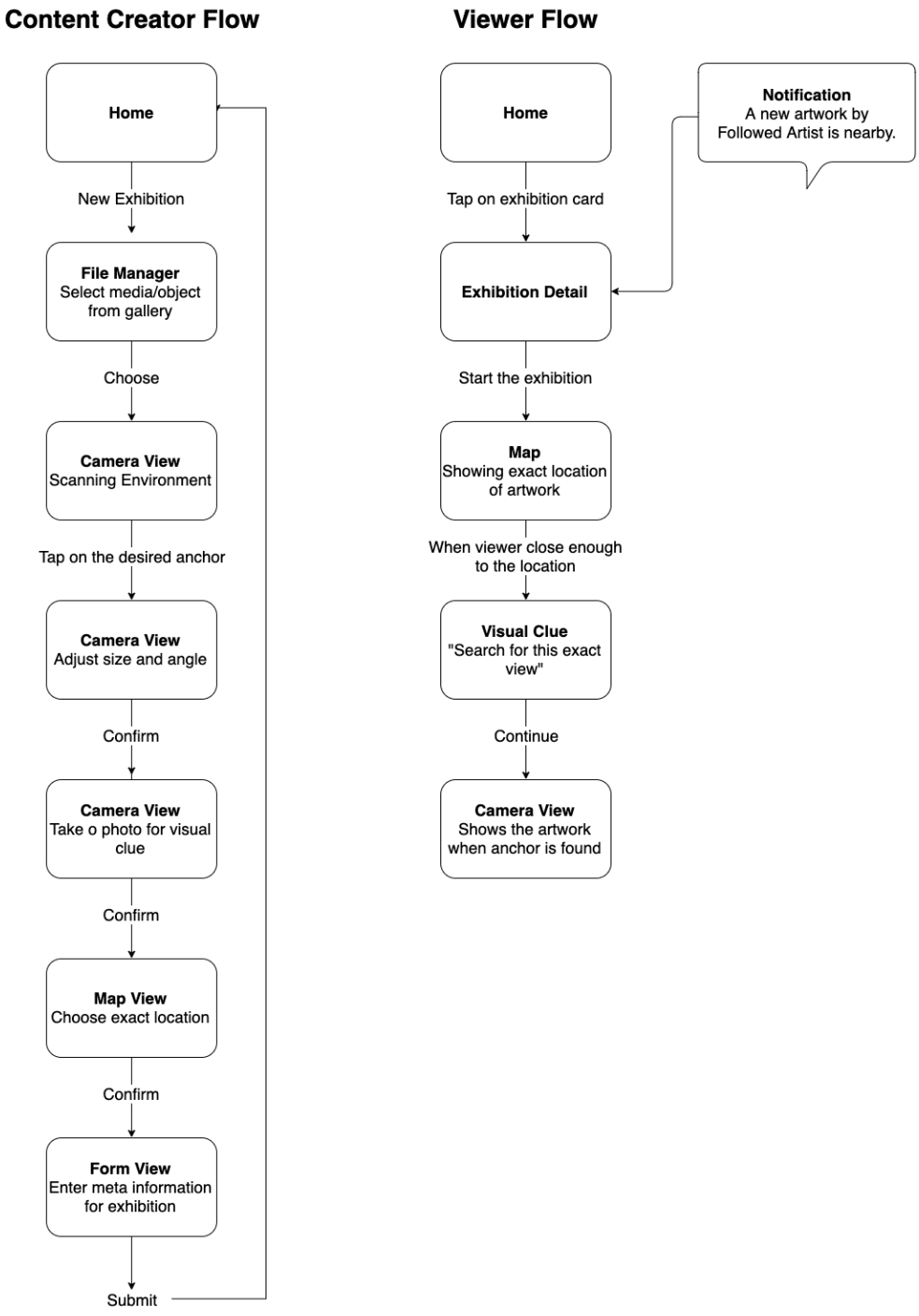
10.12. Time on Task Table

Participant	Task 1	Task 2
1	134	83
2	141	79
3	137	76
4	129	70
5	132	73
6	147	81
7	136	78
8	157	87
9	122	69
10	135	82
Average TOTAL*	**137**	**77,8**

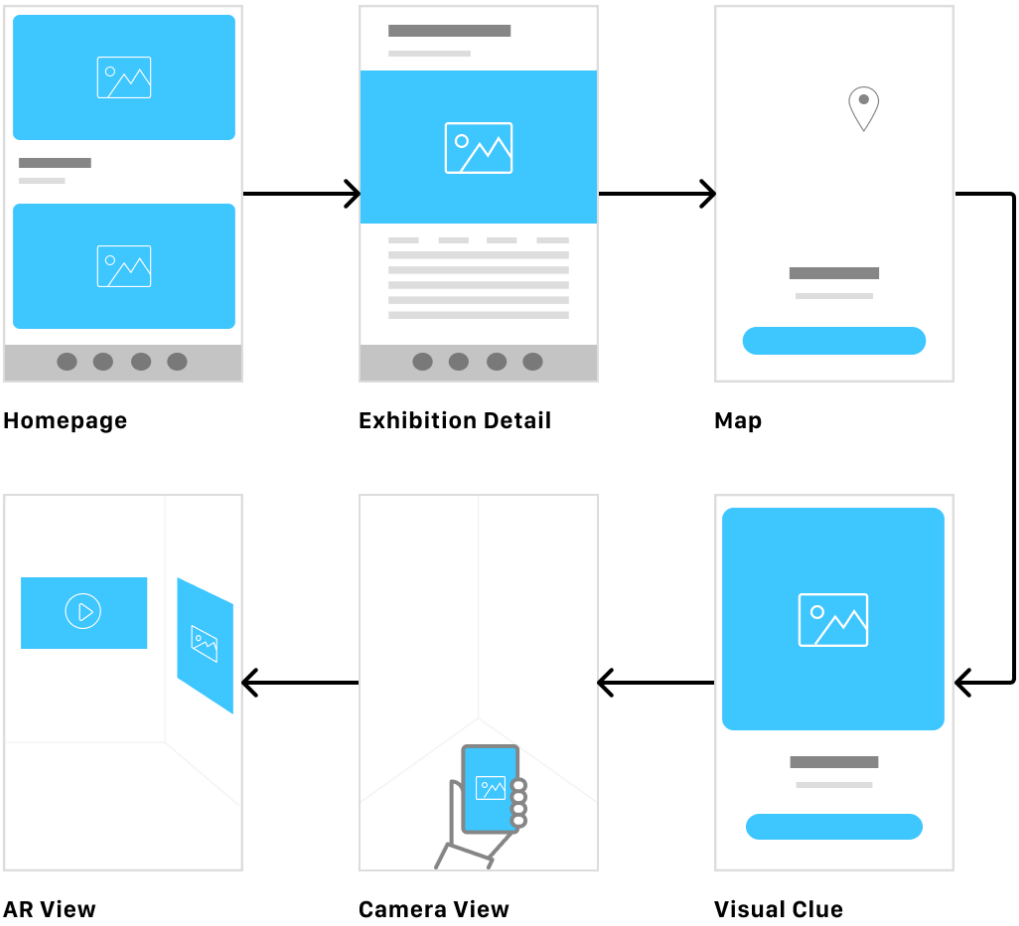
10.13. Full Ratings Table

Participant	Task 1	Task 2	Overall*
1	5	5	4,4
2	5	5	5
3	4	5	4,2
4	5	5	4,6
5	5	5	4,2
6	5	5	4,8
7	5	5	4,8
8	4	4	3,8
9	5	5	5
10	5	5	4,4
Average TOTAL*	**4,8 (96,00%)**	**4,9 (98,00%)**	**4,52 (90,40)**

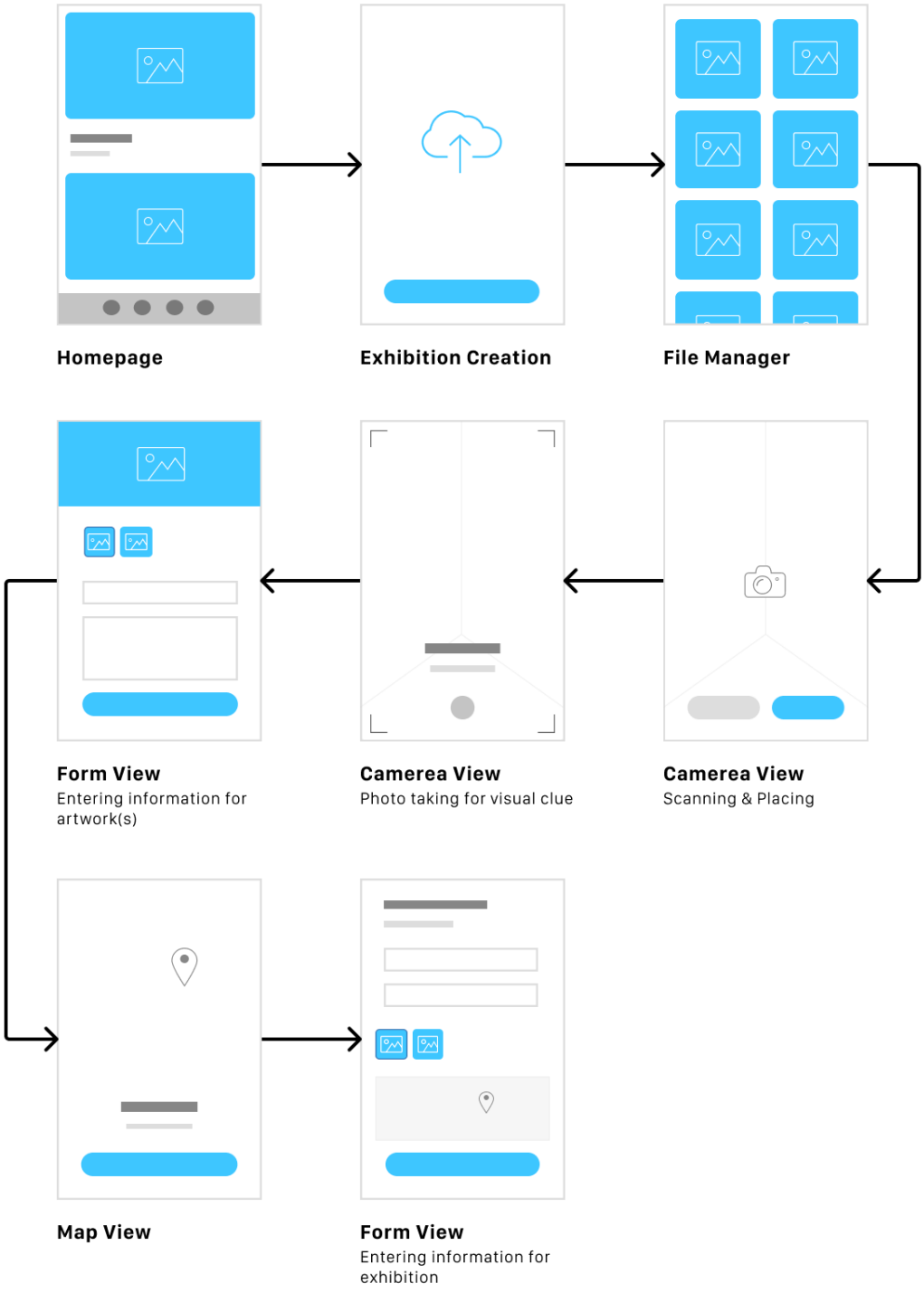
10.14. Preliminary Wireframes and User Flows



Preliminary User Flows



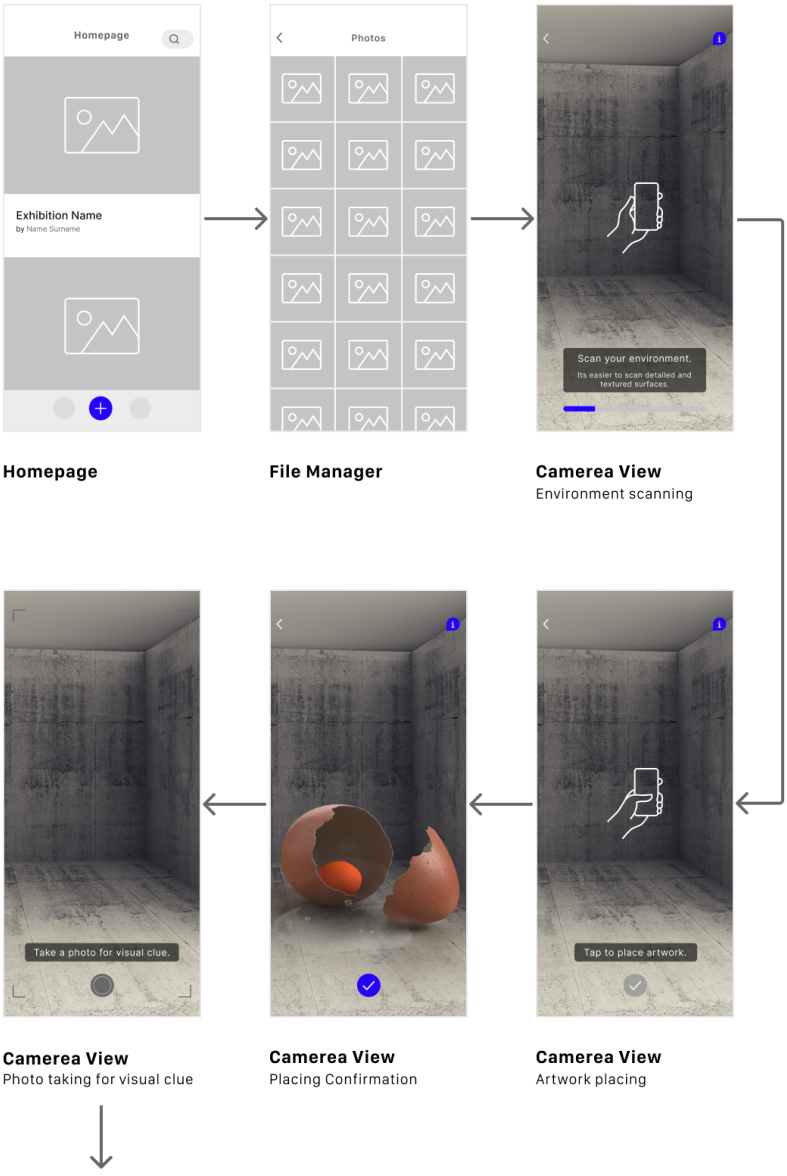
Preliminary Wireframes for Viewer Flow



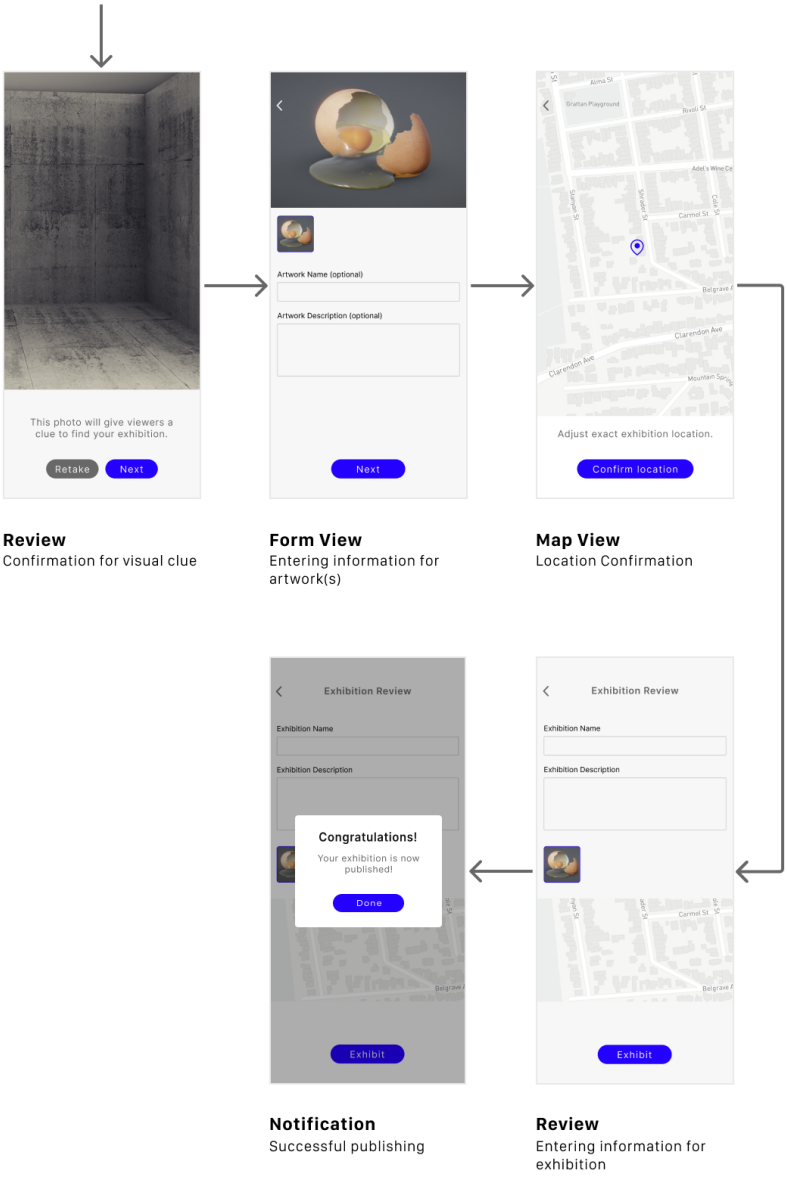
Preliminary Wireframes for Content Creator Flow

10.15 Preliminary Design Explorations

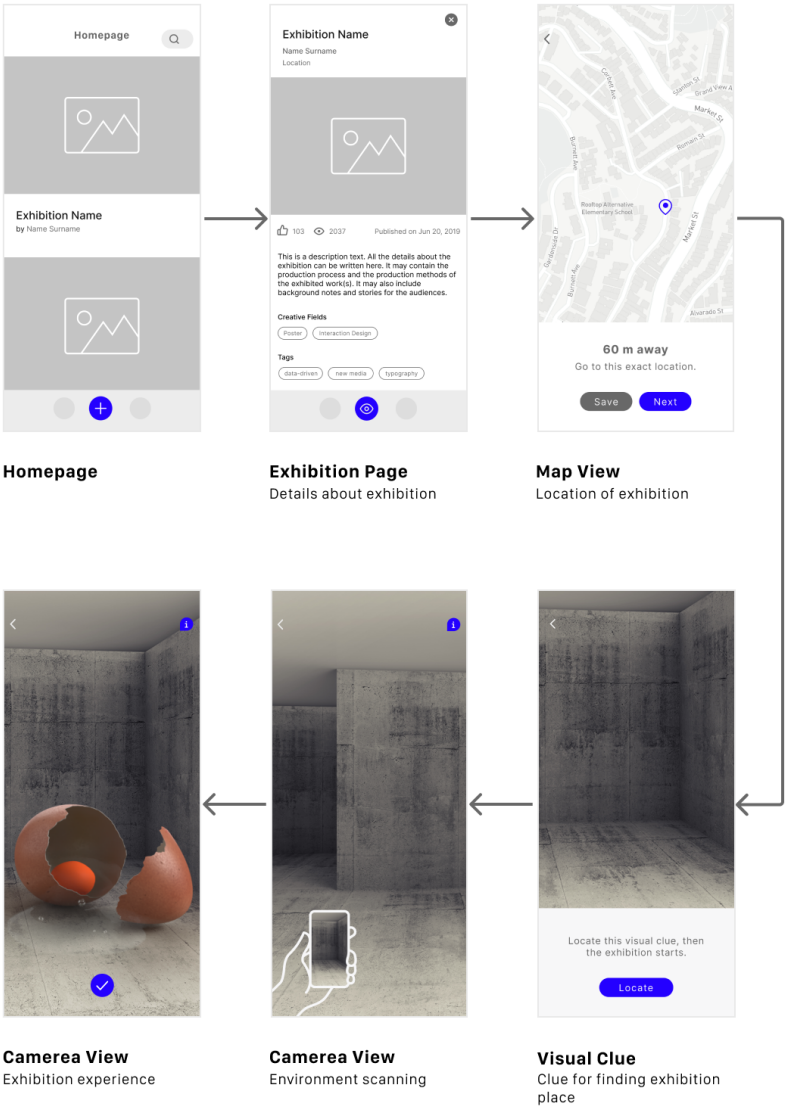
First design explorations were prepared based on previous wireframes and visual design decisions. An interactive prototype was also created with these designs for usability testing phase.



PreliminaryDesign Explorations for Exhibition Creation pt.1



Preliminary Design Explorations for Exhibition Creation pt.2



Preliminary Design Explorations for Exhibition View

10.16. Initial User Tests

Method

Usability test was performed to verify the objectives and functions of the project. Test method chosen as **moderated** and conducted **in-person** for collecting in-depth information.

The test was completed with artists and designers who were interviewed one to one during the persona creation phase. Before starting the test, information was given about the product and its goals. Participants were asked to fill out the “Pre-Test Questionnaire” form (Appendix 9) before the test. Then, each of the 10 participants was assigned following two tasks for usability testing.

- **Task 1:** Create an exhibition.
- **Task 2:** Experience an exhibition.

The participants answered some of the questions posed during the test. These questions were asked based on some observed behaviors of the participants. After completing their tasks on the prototype, each participant was asked to fill out a form with 12 questions to share their experience with the product. (Appendix 10 & 11)

Results are combined of both qualitative(observations about pathways, problems experienced, comments, recommendations and answers to open-ended questions) and quantitative(success rates, task times, satisfaction ratings) data types.

Results

Task Completion

All participants successfully completed Task 1 (create an exhibition). One participant experienced difficulty with instructions. 100% of participants were able to complete Task 2 (experience an exhibition). But, one of the ten participants needed help to complete.

Task	With Ease	Some Difficulty	Needed Help
1- Create an Exhibition	9	1	0
2- Experience an Exhibition	9	0	1

f14. *Task Completion Results*

Time on Task

The task completion time for each participant was recorded. Task 1 required participants to create an exhibition and took the longest time to complete (mean = 137 seconds). However, completion times ranged from 122 to 157 seconds.

For Participant 8 Task 1 was more difficult to complete than others because that participant has never used Instagram or Snapchat and never experienced augmented reality before.

See *Appendix 12* for full time on task table.

Overall Ratings
After task session completion, participants rated the application for five overall measures. See *Appendix 11* for questions and *Appendix 13* for all ratings given by test users.

Task	Task Completion	Time on Task	Satisfaction*
1- Create an Exhibition	10/10	137	4,8 (96%)
2- Experience an Exhibition	9/10	77,8	4,9 (98%)

f15. *Ratings Summary*

*Satisfaction score is measured by average combined rating across five post-task measures.

Observations
Participants across the test rated the ease of creating an exhibition with 4,8 (out of 5) and 96% agreed that it was easy to create an exhibition. But, the participants were asked three times, "I noticed a bit of hesitation there, what stopped you?" and then "What do you think this instruction is descriptive?". As a result, it was noted that it took time for some of the participants to understand the instruction on the "environment scanning" page. It was decided to support the instructions with visuals.

Conclusion
Most of the participants found Artribe App to be well-organized, well-specificated, very useful, and easy to use. Having an exhibition creation application is exciting for many of the participants. Implementing the recommendations and continuing to work with users will ensure a continued user-centered mobile application.