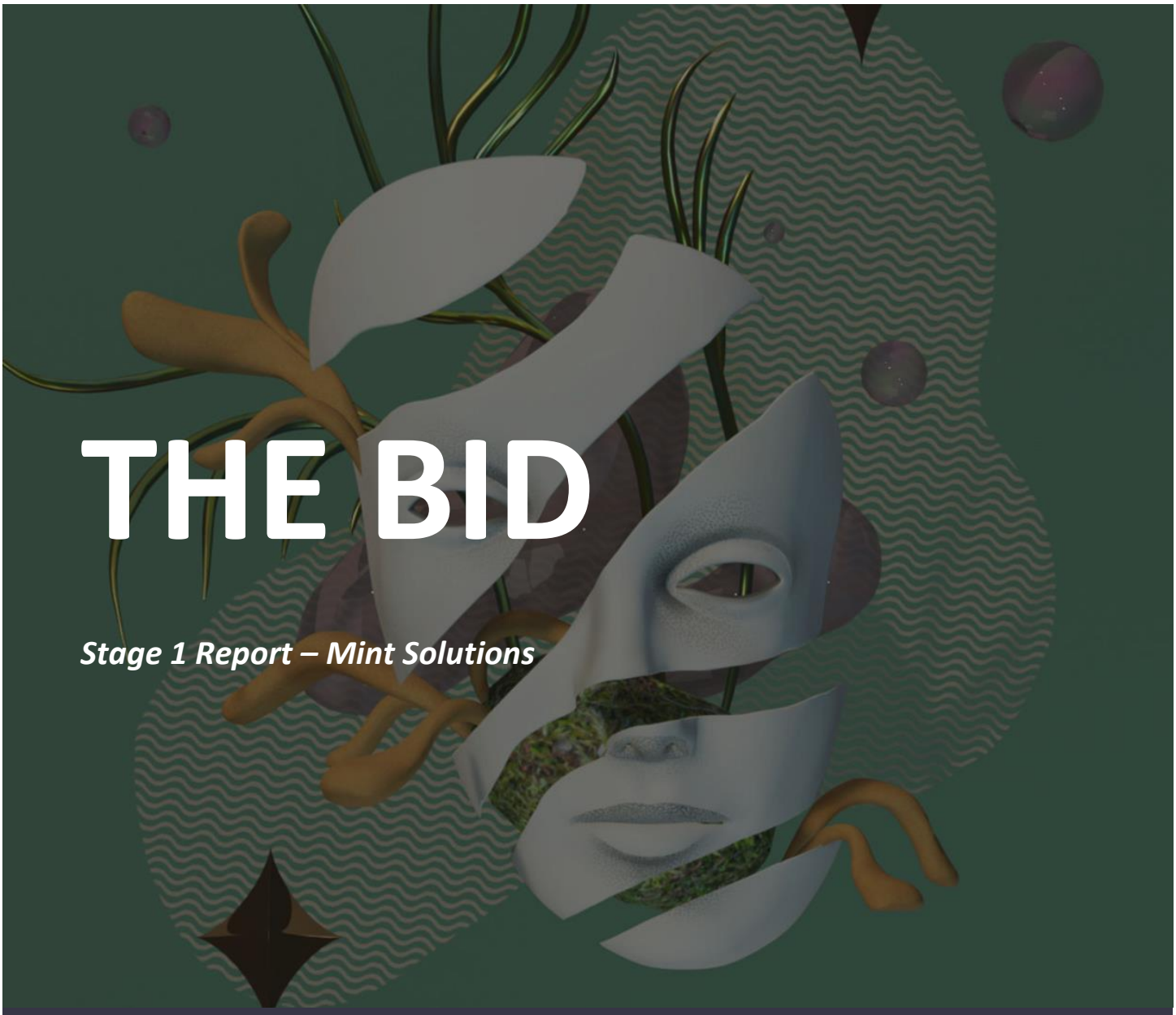

THE BID

Stage 1 Report – Mint Solutions

AAMIR NAZIR	*MN2025@HW.AC.UK*
GAURI D REVANKAR	*DR2007@HW.AC.UK*
ISMAEL SHAIKH	*MS2019@HW.AC.UK*
JACINTH DANIEL MOSES	*JDM2003@HW.AC.UK*
PRAVEEN VENKATARAMAN	*PV2003@HW.AC.UK*
RYLAN CHRIS SILVEIRA	*RCS4@HW.AC.UK*
SANJEEVANI RAJPUROHIT	*SR2033@HW.AC.UK*
TEJAS SYAM	*TS2011@HW.AC.UK*

LINE MANAGER:

MIHAILESCU, RADU-CASIAN R.MIHAILESCU@HW.AC.UK

COURSE CO-ORDINATOR:

ABBASI, UBAID U.ABBASI@HW.AC.UK

0. AUTHORSHIP FORMS

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage 1 – The Bid
Student Name:	Mohammed Aamir Nazir
Student ID Number:	H00382827

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Student Signature *(type your name):* *Mohammed Aamir Nazir*

Date: *24/11/2022*

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage 1 – The Bid
Student Name:	Sanjeevani Rajpurohit
Student ID Number:	H00379967

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Student Signature *(type your name):* *Sanjeevani Rajpurohit*

Date: *24/11/2022*

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage 1 – The Bid
Student Name:	Gauri Revankar
Student ID Number:	H00373987

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Student Signature *(type your name):* *Gauri Revankar*

Date: *24/11/2022*

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage 1 – The Bid
Student Name:	Rylan Silveira
Student ID Number:	H00314750

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Student Signature *(type your name):* *Rylan Silveira*

Date: *24/11/2022*

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage 1 – The Bid
Student Name:	Tejas Syam
Student ID Number:	H00364177

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Student Signature *(type your name):* *Tejas Syam*

Date: *24/11/2022*

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage 1 - The Bid
Student Name:	Mohammed Ismael Abidali Shaikh
Student ID Number:	H00359502

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Student Signature *(type your name):* *Mohammed Ismael Abidali Shaikh*

Date: *24/11/2022*

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage 1 - The Bid
Student Name:	Praveen Venkataraman
Student ID Number:	H00380983

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Student Signature *(type your name):* *Praveen Venkataraman*

Date: *24/11/2022*

Course code and name:	F29SO: Software Engineering
Type of assessment:	**Group**
Coursework Title:	Stage-1-The Bid
Student Name:	Jacinth Daniel Moses
Student ID Number:	H00379506

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Student Signature *(type your name):* Jacinth Daniel Moses

Date: *24/11/2022*

TABLE OF CONTENTS

- *Main pages consist from pages 12 to 62 = 50 pages.*

1. PROJECT OUTLINE/INTRODUCTION

1.1. AIM

To develop an online social platform, which enables users to connect, create and share Augmented Reality (AR) based digital content.

1.2. OBJECTIVE

The objectives are as follows:

- To provide a safe alternative to the metaverse
- Enable users to share content in an Augmented Reality format.
- Enable people of different groups to discover shared areas of interest with other like-minded people.
- Enable users to place an AR model at a certain location for other users to view.
- Enable users to interact with other users' content.
- Enable users to explore and discover new places
- To act as a source of information about landmarks such as museums, monuments, Heritage centers, natural sites and even restaurants

1.3. SCOPE

There is one system being developed - GeoTagAR.
GeoTagAR will be developed in the form of an application, providing users with a way to connect and share AR-based content. The system will function as a scrapbooking platform, allowing users to capture moments in image, audio, or video format. These moments will be geotagged when shared. Additionally, users can select specific categories to be part of, which will consist of geocachers and historians. Each category provides users with extra features developed specifically for that category.
The Database(s) will store (but not limited to):

- User information, media, analytics, likes, comments, achievements, group information and coordinates.

The primary purpose of the application is to act as an AR-based social media platform. Additionally, a promotional website for GeoTagAR will be developed.

1.4. ASSUMPTIONS

1. *The app will have the user's login to place items in certain locations*
2. *Users can see the comments left behind on their AR Memories despite not being at the location*
   2.1. *Everyone can see messages left behind i.e., no age restrictions*
3. *Once an account is set to a certain user type e.g., geocacher & historian, it cannot be changed*
4. *If you delete your account, then all the AR memories placed are removed too*
5. *Users will need to provide precise location data for the app to work.*
6. *Users can share locations to memories via a GPS marker.*

1.5. STAKEHOLDERS

The prime stakeholders of the system are:

1. *End-Users (General Users, Geocachers, Historians etc.)*
2. *Managers and other employees*
3. *Data analysts*
4. *Advertisers*
5. *Investors*

1.6. INITIAL ROLES

NAME	ROLE	BELBIN TYPE
AAMIR NAZIR	*TECHNICAL MANAGER*	*SPECIALIST*
GAURI D REVANKAR	*ORGANISATIONAL MANAGER, LIASON*	*PLANT*
ISMAEL SHAIKH	*TECHNICAL MANAGER, REPORTER*	*SHAPER*
JACINTH DANIEL MOSES	*LEAD DEVELOPER, LIASON*	*CO-ORDINATOR*
PRAVEEN VENKATARAMAN	*DEVELOPER*	*COMPLETER FINISHER*
RYLAN CHRIS SILVEIRA	*DEVELOPER*	*TEAMWORKER*
SANJEEVANI RAJPUROHIT	*DEVELOPER*	*TEAMWORKER*
TEJAS SYAM	*DEVELOPER*	*IMPLEMENTER*

2. REQUIREMENTS

2.1. FUNCTIONAL REQUIREMENTS

ID	*Description*	Priority
F-UR-1	**ACCOUNT CREATION** ***F-UR-1.1*** *- The user must be able to create an account after providing the following details:* 1. *First name (optional)* 2. *Last name (optional)* 3. *Username (mandatory) -linked to* ***NF-SR-1*** 4. *Password (mandatory) - linked to* ***NF-SR-1*** 5. *Password confirmation (mandatory)* 6. *Phone number (optional)* 7. *Email address (mandatory)* 8. *Date of birth (mandatory)* *8.1 The user must be ages 13 or above* 9. *Gender (optional)* 10. *Account category selection (mandatory) - linked to* ***NF-SR-18*** 10.1. *Geocacher* 10.2. *Historian* 10.3. *General user* ***F-UR-1.2 –*** *The user must agree to the Terms and Conditions of the system before signing up* - linked to **NF-SR-1** ***F-UR-1.3****- The user is sent an email verification link which is sent to their email – Linked to* ***NF-SR7.9***	M
F-UR-2	*The user must be able to login using the following credentials:* 1. *Email or username (mandatory)* 2. *Password (mandatory)*	M
F-UR-3	*The user should be able to log out of the system.*	M
F-UR-4	**MEMORIES** **F-UR-4.1** *- The user must be able to create a memory.* ***F-UR.4.2*** *- The user must be able to edit the following in a memory* - *Title* - *Filters* - *captions* - *Delete the memory* **F-UR-4.3** *-The user must be able to share content (photos or videos) as a Memory*	M

F-UR-5	**SCRAPBOOK** ***F-UR-5.1*** *- The user must be able to add/remove selected memories to a Scrapbook.* ***F-UR-5.2*** *- The user must be able to create a scrapbook.* ***F-UR-5.3*** *- The user must be able to edit/modify a scrapbook.* ***F-UR-5.4*** *- The user must be able to delete a scrapbook.*	M
F-UR-6	**GROUP** ***F-UR-6.1 –*** *The user must be able to create groups/communities for like-minded people* ***F-UR-6.2 –*** *The user must be able to join a group* ***F-UR-6.3 –*** *The user must be able to leave a group* ***F-UR-6.4 –*** *The user must be able to modify a group* - *The* user *must* be able to set the created group to public or private - The user *must* be able to switch group type to public or private - *The* user *must* be able to add members to a group ***F-UR-6.5*** *- The user must be able to delete a group created by them*	M
F-SR-1	*The system must be connected to the internet*	M
F-SR-2	*The system must have access to the GPS location of the user*	M
F-SR-3	*The system must have access to the camera*	M
F-SR-4	*The system must filter inappropriate and illegal content*	M
F-SR-5	*The system should produce summary reports for platform managers concerning overall platform usage.*	M
F-SR-6	*The system should enable memories to be grouped and organized based on:* 1. *Physical Location* 2. *Groups that users can create*	M
F-SR-7	*The system must save any changes made by user in the database*	M
F-SR-8	*The system must geotag Scrapbooks and Memories on the Map.*	M

2.2. NON-FUNCTIONAL REQUIREMENTS

ID	Description	Priority
NF-UR-1	**FEEDBACK** ***NF-UR-1.1*** *- The user must be able to provide feedback/comments to posted memories.* ***NF-UR-1.2*** *- The user must be able to view and add derivative annotations*	M

NF-UR-2	*The user should be able to report messages if they deem it to be fake news or offensive.*	S
NF-UR-3	***Profile Modification*** NF-UR-3.1 - *The user must be able to change the following account details* 1. *Profile* picture. 2. *Account Username* 3. *Account password* 4. *First name* 5. *Last name* 6. *Phone number* 7. *E-mail* 8. *Date of Birth* 9. *Gender* NF-UR-3.2 - *The user must be able to add a bio/sub-description.* NF-UR-3.3 - *The user must be able to set their preferred visibility on their profile.* 1. *Visible to all* 2. *Visible to friends only*	
NF-UR-4	*The user must be able to remove their memories*	
NF-UR-5	*The user must be able to add and remove other users as a "friend"*	M
NF-UR-6	*The user must be able to block other users.*	M
NF-UR-7	*The user must be able to schedule the date and time for posting a memory.*	M
NF-SR-1	**The system must allow users to create an account only if:** 1. *The username is unique* 2. *The username is 6 – 30 characters long* 3. *The username only consists of letters, numbers, and special characters like '('and ')'.* 4. *The password is 6 - 20 characters long* 5. *The password contains an uppercase character, a number, and a special character.* 6. *The password doesn't contain the first name, last name, or the username of the user* 7. *The password matches with the entered confirm password* 8. *The user agrees to the terms and conditions of the system.*	M
NF-SR-2	*The system must allow users to report misinformation and issues.*	M
NF-SR-3	*The system must let the user edit/modify media (memories and scrapbooks) posted by them.*	M
NF-SR-4	*The system should be able to suggest tips to users when the user is creating or modifying a scrapbook.*	S

NF-SR-5	***Usability*** *NF-SR5.1 The system must provide an interface for the users to operate with minimum difficulty (user-friendly).* *NF-SR5.2 The system must provide introductory annotations to familiarize the new users with the functionality of the system.*	M
NF-SR-6	***Portability and Compatibility*** ***NF-SR6.1*** *The system should be fully responsive across the following web browsers:* 1. *Google Chrome* 2. *Mozilla Firefox* 3. *Apple Safari* 4. *Microsoft Edge* ***NF-SR6.2*** *The system should be able to run on different devices (mobile, laptop etc.)*	M
NF-SR-7	***Security*** ***NF-SR7.1-*** *The system should provide 2 factor authentication* ***NF-SR7.2-*** *The system shall store the user's personal data in a database* ***NF-SR7.3-*** *The system shall encrypt and store the passwords in a database* ***NF-SR7.4-*** *The databases should be accessible only by the database administrators.* ***NF-SR7.5-*** *The system should block login to an account after a certain number of login attempts.* ***NF-SR7.6-*** *The system should use the HTTPS protocol while communicating to the client.* ***NF-SR7.7-*** *The system should be able to detect and prevent attempts at SQL injection by performing input validation, parameterized queries, prepared statements etc.* ***NF-SR7.8-*** *The system should lock an account after 3 failed login attempts.* ***NF-SR7.9-*** *The system should send an email to verify whether the user owns the email they signed up with (Email Verification).*	S
NF-SR-8	***Availability and Reliability*** ***NF-SR8.1*** *The system should be available 99.99% of the time, annually* ***NF-SR8.2*** *The system should suffer at most 4 minutes and 22 seconds of downtime per month*	S
NF-SR-9	*The system could recommend platform users about nearby scrapbooks and contacts.*	C

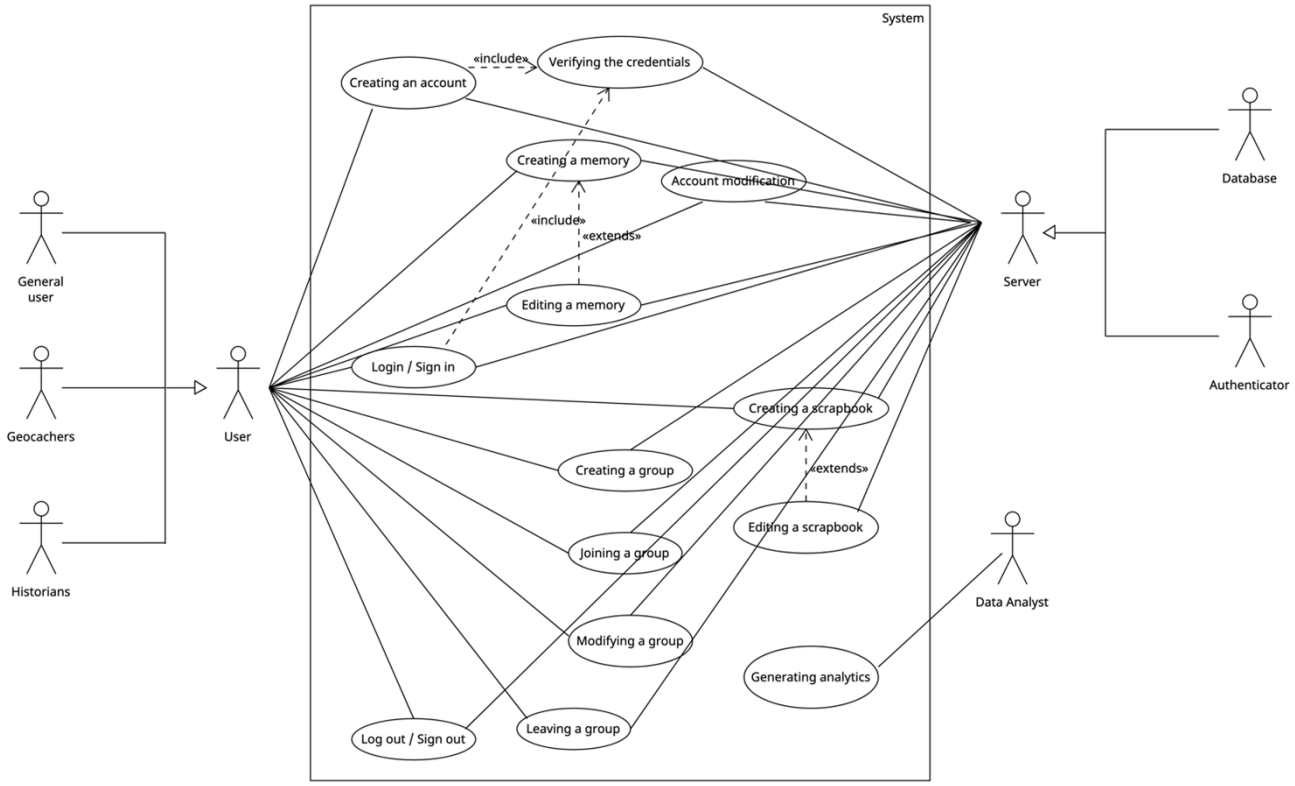
NF-SR-10	*The system must provide additional features for creating and modifying media (such as photo filters, voiceover, GIF generation).*	M
NF-SR-11	*The system must allow users to recover their passwords by clicking on "forgot password".*	M
NF-SR-12	***Scalability*** ***NF-SR12.1*** *System should be able to adapt to growing demand to manage additional data.* ***NF-SR12.2*** *System must be able to maintain its optimization even with the growing number of users*	M
NF-SR-13	***Responsiveness*** ***NF-SR13.1*** *System must be able to save state and return to the same state/page if the user is interrupted by a call* ***NF-SR13.2*** *System must be responsive to user input*	M
NF-SR-14	***Performance*** ***NF-SR14.1*** *System mustn't take more than 3 seconds to load the initial screen* ***NF-SR14.2*** *System must be optimized to use less data when users are on cellular data*	M
NF-SR-15	***Network Coverage*** ***NF-SR15.1*** *Basic system functions should be able to work with low/poor internet connectivity* ***NF-SR15.2*** *System should be able to automatically switch to mobile network in case of poor Wi-Fi if the user allows it*	S
NF-SR-16	***Accessibility*** ***NF-SR16.1*** *System could have a voiceover feature for the visually impaired (Color blind)* ***NF-SR16.2*** *System could have a "Speech" option to choose different voiceover accents to help the user understand better* ***NF-SR16.5*** *System could have an option "Color Filters" to help users who are color blind differentiate colors and help those having difficulty reading text* ***NF-SR16.3*** *System could have an option to change language* ***NF-SR16.4*** *System could have an option to change text formatting from right to left*	C

NF-SR-17	**ACCOUNT TYPES** ***NF-SR-17.1 - General Users*** ***NF-SR-17.1.1*** *- The system should enable users to create their own filters with interactive fictional characters/objects and share them so that other users can use them at that geographic location.* ***NF-SR17.2 - Geocacher Account*** ***NF-SR17.2.1 -*** *The system should award achievements/badges to user to display them in their personal profiles based on* - *The number of quests completed* - *Creates a record time for completing a quests* ***NF-SR17.3*** **- Historian Account** ***NF-SR-*** **17.3.1 -** The system should allow users to create Self-Guided Tour Scrapbooks at a particular location. ***NF-SR-*** **17.3.2 -** The system should allow users to create Trivia or similar quizzes related to a historic site.	S
NF-SR-18	*The system should automatically filter profanity in places such as:* 1. *Group Names* 2. *Posts* 3. *Comments* 4. *Annotations* 5. *Usernames*	M
NF-SR-19	*The system must support facilities and provide separate interfaces for the different potential users:* 1. *Such as generating analytics for data scientists* 2. *Allow programmers to use API'S that interact with the system*	S
NF-SR-20	*The system must allow users to download photos and videos only related to their account/ only from their account.*	M

- *ACRONYMS CAN BE FOUND IN SECTION 8.1*

3. UNIFIED MARKUP LANGUAGE DIAGRAMS (UML)

3.1. UML USE CASE DIAGRAM



3.2. UML USE CASE TEXTUAL/ SPECIFICATION

Use Case: Creating an Account	**Use Case: Signing Into an Account**
ID: *1*	**ID: 2**
Goal: To *create a user account*	**Goal:** To *sign into a user account*
Primary Actor: User	**Primary Actor: User**
Secondary Actor(s): Server	**Secondary Actor(s): Server**
Pre-Conditions: 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user has the application open.*	**Pre-Conditions:** 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* The user has the application open.
Post-Conditions: **1. The account is created**	**Post-Conditions:** The user is able to sign into their account.
Main Flow: 1. *The user requests to create an account.*	**Main Flow:** 1. *The user requests to sign in into their account.*

2. *The system displays the account creation page.*
3. *The system requests for the user's personal details*
   3.1. *First name*
   3.2. *Last name*
   3.3. *Phone number*
   3.4. *Date of Birth*
   3.5. *Gender*
   3.6. *Username*
   3.7. *Password*
   3.8. *Email*
   3.9. *Type of account (general, historians, geocachers)*
4. *The user provides the necessary details.*
5. *Include(VerificationOfCredentials).*
6. *The created account is added to the database.*
7. *The user account is created successfully.*

Alternate Flow(s):

<5a> The verification fails
1. An "Error" message is displayed
2. Return to step 3 of main flow

<5b> If the User account is already created
1. Display "User Account already Exists" message.
2. Return to step 3 of main flow

2. *The user is redirected to the sign in page.*
3. *The system requests the user to enter the username and password of the account.*
4. *Include (VerificationOfCredentials).*
5. *The user signs in into their account successfully.*

Alternate Flow(s):

<5a> The user account doesn't exist in the database records
1. The system displays an error message.
2. Return to step 3 of main flow

<5b> The credentials are invalid

1. *The system displays an error message*
2. *The incorrect tries counter goes up by 1*
3. *Return to step 3 of main flow.*

<5c> Input of invalid credentials 3 times in a row

1. *The system displays error message "It seems you have forgotten your password, please reset your password in order to login*
2. *Email is sent to user*

Return to step 3 of Main Flow

Use Case: Logging out of an Account	Use Case: VerificationOfCredentials
ID: 3	**ID: 4**
Goal: To *sign out of a user account*	**Goal:** To verify the details entered by the user on the Account Creation and Sign In Pages.
Primary Actor: User	**Primary Actor: User**
Secondary Actor(s): Server	**Secondary Actor(s): Server**
Pre-Conditions: 1. *The server is functioning correctly.* 2. *The user is connected to the internet.*	**Pre-Conditions:** 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user is on a compatible device*
Post-Conditions: The user is logged out.	**Post-Conditions:** The entered details are verified and validated.
Main Flow: 1. *The user requests goes to the profile page.* 2. *The user clicks the logout button.* 3. *The system saves any pending analytics in the database.* 4. *The user is logged out.*	**Main Flow:** 1. *The system requests for verification of details entered by the user from the server.* 2. *The server provides approval.*
Alternate Flow(s): NONE	**Alternate Flow(s):** *<2a> Invalid details are provided* *1. The system disapproves the validity of the details.* *2. Terminate use case.*

Use Case: Creating a group	Use Case: Joining a group
ID: 5	**ID: 6**
Goal: To *create a group*	**Goal: To** *join an existing group*
Primary Actor: User	**Primary Actor:** User
Secondary Actor(s): Server	**Secondary Actor(s):** Server
Pre-Conditions: 1. *The server is functioning correctly.* 2. *The user is connected to the internet* 3. *The user must have an account.*	**Pre-Conditions:** 1. *The server is functioning correctly.* 2. *The user is connected to the internet* The user must have an account.
Post-Conditions: 1. *The user has created a group which other users can join.*	**Post-Conditions:** ***1.*** *The user joins the group successfully*
Main Flow: 1. *The user logs into their account.*	**Main Flow:** 1. *The user logs into their account.*

2. *The user clicks on "Create New Group" button* 3. *The user selects the category the group must fall under* 4. *The user fills in the following:* a. *Group Name* b. *Make the group public or private* c. *category the group must fall under* d. *add participants* e. *group profile picture* f. *group description* 5. *The user decides the name of the group.* 6. *The user adds the members to the group.* 7. *The user clicks on "CREATE" button to complete the process of creating a group* 8. *A new group is created successfully.*	2. *The user searches for the group in the search bar or using the group category* 3. *The user clicks on the "Join" button next to the group name.* 4. *Admin allows entry into group* 5. *The user joins the group successfully*
Alternate Flow(s): <6a>. The user faces an error while creating the group *1. An "Error" message is displayed, requesting the user to retry.* *2. Return to step 2 of Main Flow.* *<4a> The user uses an inappropriate group name* *1. A warning is displayed, requesting the user to select a different group name.* *2. Return to step 2 of Main Flow.* *<4b>. The user uses a group name that already exists* *1. A warning is displayed, requesting the user to select a different group name.* *2. Return to step 2 of Main Flow.*	**Alternate Flow(s):** *<2a> The group does not exist* *1. A "No group found" message is displayed.* *2. Return to step 2 of Main Flow.* *<3a> The user faces an error while joining the group* *1. An "Error" message is displayed, requesting the user to retry.* *2. Return to step 3.* *<4a> The admin denies entry into group* *1. An "Entry Denied" message is displayed* *2. Terminate use case.* *<4b> If the group is public* 1. *Return to Step 5 of Main Flow*

Use Case: Leaving a group	**Use Case: Modifying a group**
ID: 7	**ID: 8**
Goal: To leave a joined group	**Goal: To modify a group**
Primary Actor: User	**Primary Actor:** User
Secondary Actor(s): Server	**Secondary Actor(s):** Server
Pre-Conditions: 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user must have an account.* 4. *The user must be a participant in the group*	**Pre-Conditions:** 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user has the application open.* The group exists and user is admin.

Post-Conditions: 1. *The user leaves the group successfully*	**Post-Conditions:** The group is modified.
Main Flow: 1. *The user logs into their account.* 2. *The user selects/clicks on the group they want to leave* 3. *The user clicks on the "Leave Group" button* 4. *The system sends a confirmation message* 5. *The user agrees to the message* 6. *The user leaves the group*	**Main Flow:** 1. *The user clicks on Modify Group* 2. *The user can modify the following:* 2.1. *Group Name* 2.2. *Make the group public or private* 2.3. *Change the type of users that can join the group* 2.4. *add or remove participants* 2.5. *add or remove moderators/admins* 2.6. *group header picture* 2.7. *group profile picture* 2.8. *group description* 3. *The system requests for confirmation* 4. *The user confirms the changes* The server successfully commits the changes to the database
Alternate Flow(s): *<5a> The user disagrees on the confirmation message* 1. *The user remains a participant in the group* 2. *Terminate use case.* *<4a> The user faces an error while leaving the group* *1. An "Error" message is displayed, requesting the user to retry.* *2. Return to Step 3 of Main Flow*	**Alternate Flow(s):** *<4a> an error occurs* 1. *An "Error" message is displayed, requesting the user to retry.* Return to Step 2 of Main Flow

Use Case: Account Modification	**Use Case: Generating Analytics**
ID: 9	**ID: 10**
Goal: To modify a user's personal account	**Goal: To gather analytics from the app**
Primary Actor: User	**Primary Actor:** Data Scientist
Secondary Actor(s): Server	**Secondary Actor(s):** Server
Pre-Conditions: 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user is signed into their account.*	**Pre-Conditions:** The server is functioning correctly.
Post-Conditions: 5. *The account is modified according to the users changes and the database is updated*	**Post-Conditions:** The server exports all analytics.

Main Flow: 1. *The user navigates to the account tab.* 2. *The user clicks the account modification button.* 3. *The user can modify the user's personal details (First name, Last name, Phone number, Date of Birth, Gender etc.), password and email.* 4. *The modified account's records are updated in the servers database.*	**Main Flow:** 1. *The data scientist requests the apps analytics* 2. *The server captures the following analytics:* 1.1. *User retention* 1.2. *Average time spent on the app* 1.3. Number of scrapbooks created, edited, and deleted 1.4. Number of memories created, edited, and deleted 1.5. Number of groups created, modified, deleted 1.6. Chats ***3.*** *The server exports all data in a file format to be determined*
Alternate Flow(s): *<3a> if email is changed* 1. *Email verification is required, and an email is sent to the previous registered email and the new one* 2. *The link sent to the new email verifies the new account while the link to the old email can verify or deny the change.* 3. *Return to step 4* *<4a> an error occurs* 1. *An "Error" message is displayed, requesting the user to retry.* 2. *Return to Step 2 of Main Flow*	**Alternate Flow(s):** *<3a> an error occurs* 1. *An "Error" message is displayed, requesting the user to retry.* Return to Step 1 of Main Flow

Use Case: Creating a memory	**Use Case: Editing a Memory**
ID: 11	**ID: 12**
Goal: To create a memory	**Goal:** To edit a memory
Primary Actor: User	**Primary Actor:** User
Secondary Actor(s): Server	**Secondary Actor(s):** Server
Pre-Conditions: 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user is on a compatible device.* 4. *The user has the application open.* 5. *The user has signed into their account.*	**Pre-Conditions:** 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user is on a compatible device.* 4. *The user has the application open.* 5. *The user has signed into their account.* 6. *A memory exists.*
Post-Conditions: 1. *The user creates a memory successfully.*	**Post-Conditions:** The user edits a memory successfully.

Main Flow: 1. *The user clicks on 'Capture Memory' button* 2. *The system has Camera access of device* 3. *The system has Microphone access* 4. *The system has Live Location access* 5. *The system has access to Gallery* 6. *The user captures a photo or a video* 7. *The user shares the memory* 8. *The user creates a memory successfully* 9. *The shared memory is stored in the database.*	**Main Flow:** 1. *The user clicks on "Edit Memory" button* 2. *The user selects the memory they wish to edit or delete* 3. *The user edits/deletes a memory successfully*
Alternate Flow(s): ***<2a>*** *The system does not have Camera access of device* 1. *The system requests camera access* 2. *The user allows access* 3. *Use case Terminates* ***<3a>*** *The system does not have Microphone access* 1. *The system requests Microphone access* 2. *The user allows access* 3. *Use case Terminates* ***<4a>*** *The system does not have* Live Location *access* 1. *The system requests Live Location access* 2. *The user allows access* 3. *Use case Terminates* ***<5a>*** *The system does not have* Gallery *access* 1. *The system requests Gallery access* 2. *The user allows access* 3. *Use case Terminates* ***<8a>*** *The user schedules the date and time for posting the memory* 1. *The user sets the date and time of posting* 2. *The system asks for confirmation* 3. *The user clicks on the Confirm button* 4. *Return to Step 9 of main flow* ***<7a>*** *The user encounters an error while posting* 1. *The post (memory) gets saved to drafts*	**Alternate Flow(s):** *<1a> Invalid personal details provided* 1. *The user is returned to step 1 of the main flow* <2a> The user wishes to edit a memory 1. *The user changes filters applied to the memory* 2. *The user updates captions written for the memory* 3. *The user clicks on Save Changes* 4. *Return to step 3 of main flow* <2b> The user wishes to delete a memory 1. *The user clicks on 'Delete memory' button* 2. *Return to step 3 of main flow*

2. *Use case Terminates* ***<7b>*** *The user edits the memory before sharing* 4. *The user applies filters to the memory* 5. *The user adds captions to the memory* 6. *The user clicks on Save Changes* 7. *Return to Step 8 of Main Flow.*	

Use Case: Creating a scrapbook	**Use Case: Modifying a scrapbook**
ID: 13	**ID: 14**
Goal: To create a scrapbook	**Goal: To modify a scrapbook**
Primary Actor: User	**Primary Actor:** User
Secondary Actor(s): Server	**Secondary Actor(s):** Server
Pre-Conditions: 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user has the application open.* 4. *The user is on a compatible device.* 5. *Pre-existing memories*	**Pre-Conditions:** 1. *The server is functioning correctly.* 2. *The user is connected to the internet.* 3. *The user has the application open.* 4. *The user is on a compatible device.* Pre-existing scrapbook
Post-Conditions: *1. The user creates a scrapbook successfully*	**Post-Conditions:** *1. The user modifies a scrapbook successfully*
Main Flow: 1. *The user clicks on 'Create Scrapbook'* 2. *The user decides a name for the Scrapbook* 3. *The user chooses the memories to be added to the scrapbook* 4. *The user posts the scrapbook at the location on the map* 5. *The system asks for confirmation* 6. *The user gives the confirmation* 7. *A new scrapbook is created at that location*	**Main Flow:** 1. *The user selects a scrapbook to edit* 2. *The user has the following options to edit:* 1.1. *Add memories to the scrapbook* 1.2. *Remove memories posted by them from the scrapbook* 1.3. *Annotate a scrapbook* 1.4. *Delete a scrapbook* The server is updated
Alternate Flow(s): *<4a> The user encounters an error while posting the scrapbook* 1. *The system reports an error message* 2. *Return to Step 4 of main flow* *<2a> The scrapbook is given an invalid name* 1. *The system asks the user to choose another name for the scrapbook* 2. *Return to Step 2*	**Alternate Flow(s):** *<3a> If an error occurs while modifying a scrapbook* 1. *The system displays an error message* 2. *Return to Step 2 of main flow* *<2a> If the user is the creator of the scrapbook, the user has the options to* 1. *Rename the scrapbook*

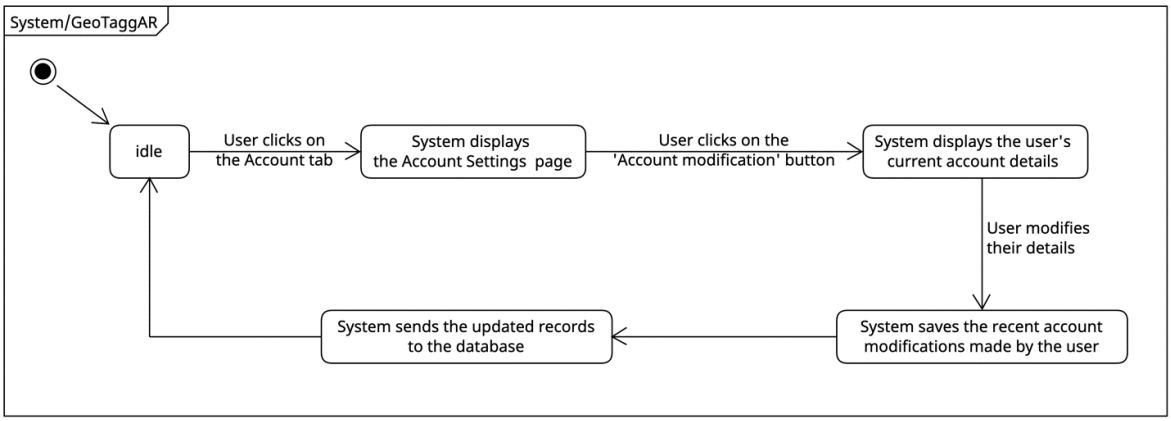
<2b> The scrapbook is given a name that already exists 1. *The system asks the user to choose another name for the scrapbook* 2. *Return to Step 2*	

3.3. USE CASE TRACEABILITY MATRIX

	UC1	UC2	UC3	UC4	UC5	UC6	UC7	UC8	UC9	UC10	UC11	UC12	UC13	UC14
F-UR-1	X													
F-UR-2		X	X	X	X	X	X	X	X		X	X	X	X
F-UR-3			X											
F-UR-4											X	X		
F-UR-5													X	X
F-UR-6					X	X	X	X						
F-SR-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F-SR-2											X		X	X
F-SR-3											X			
F-SR-4					X						X	X	X	X
F-SR-5	X	X	X	X		X	X	X		X				
F-SR-6													X	X
F-SR-7					X	X	X	X	X	X	X	X	X	X
F-SR-8											X	X	X	X

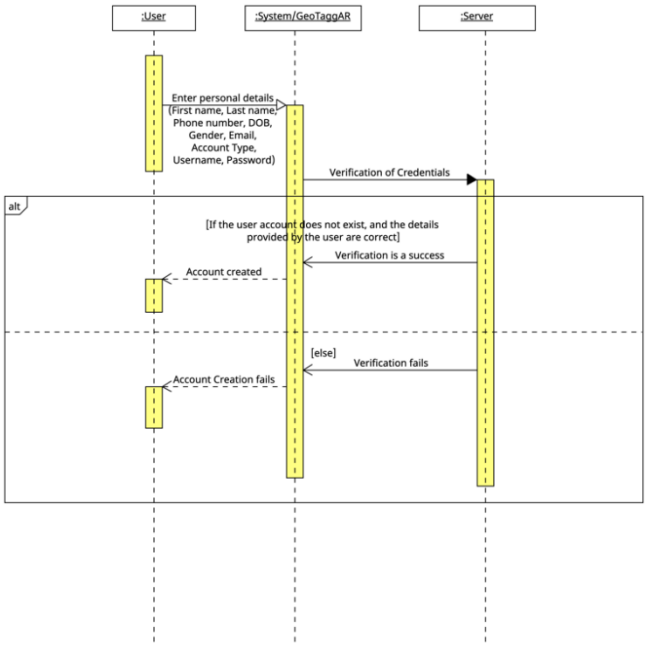
3.4. STATE MACHINE DIAGRAM

1. *Modifying account details:*

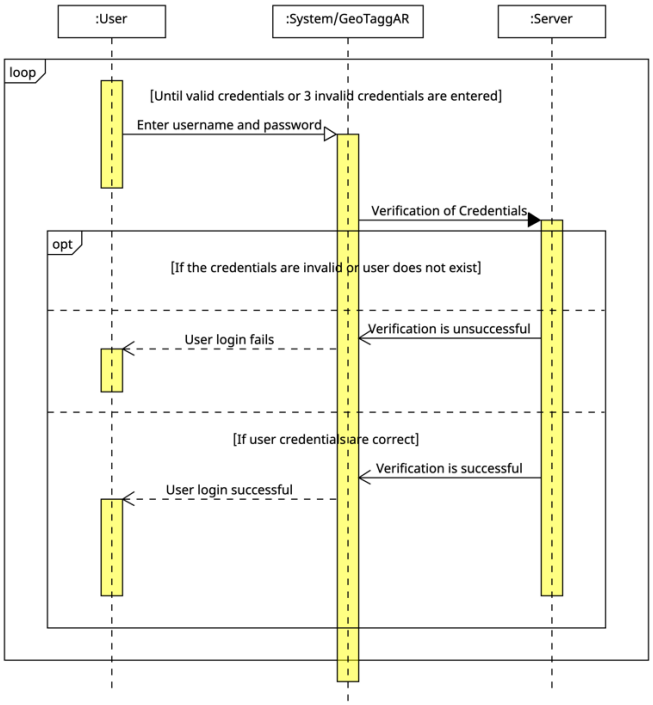


3.5. SEQUENCE DIAGRAM

1. User registration:

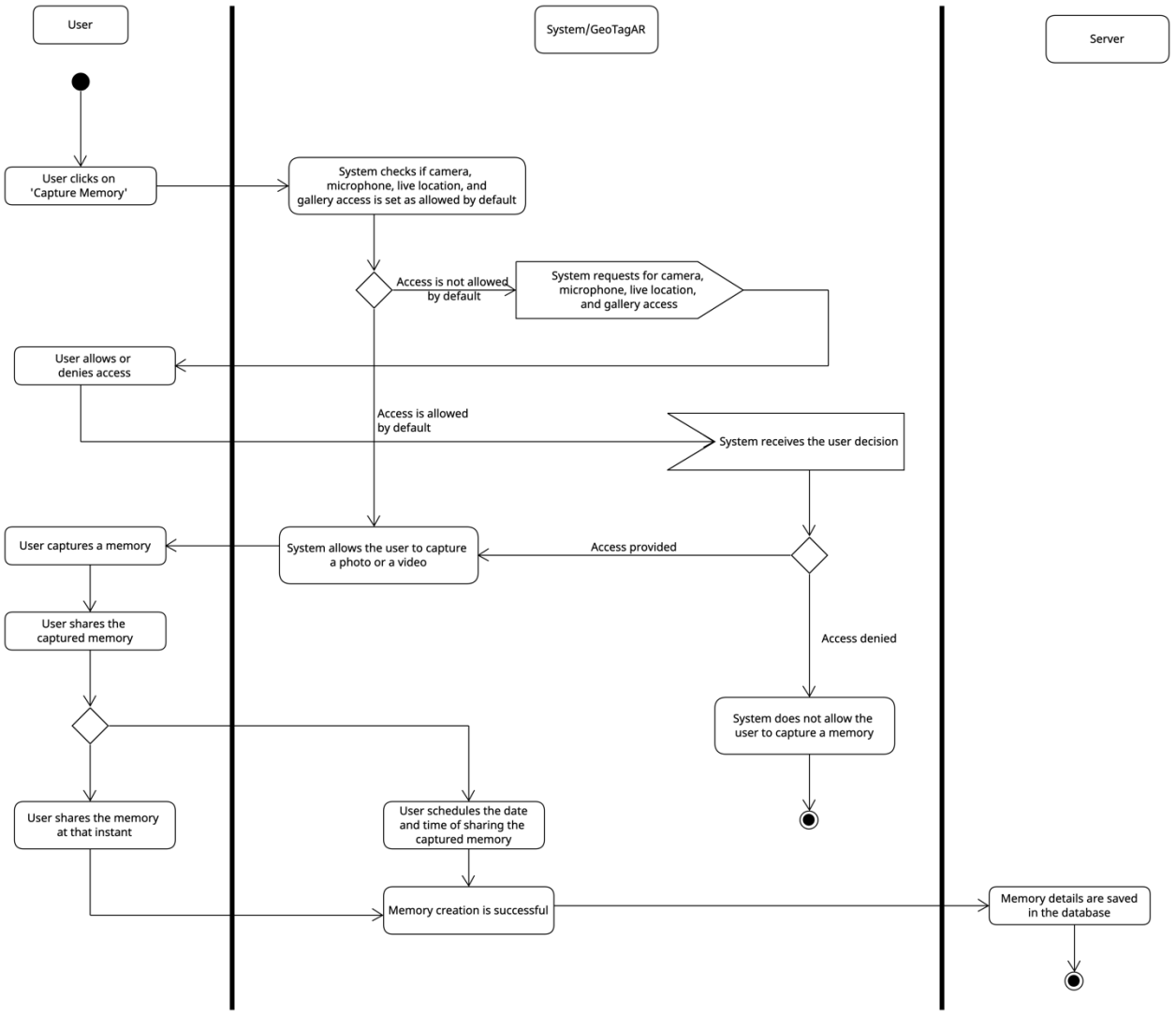


2. User login:

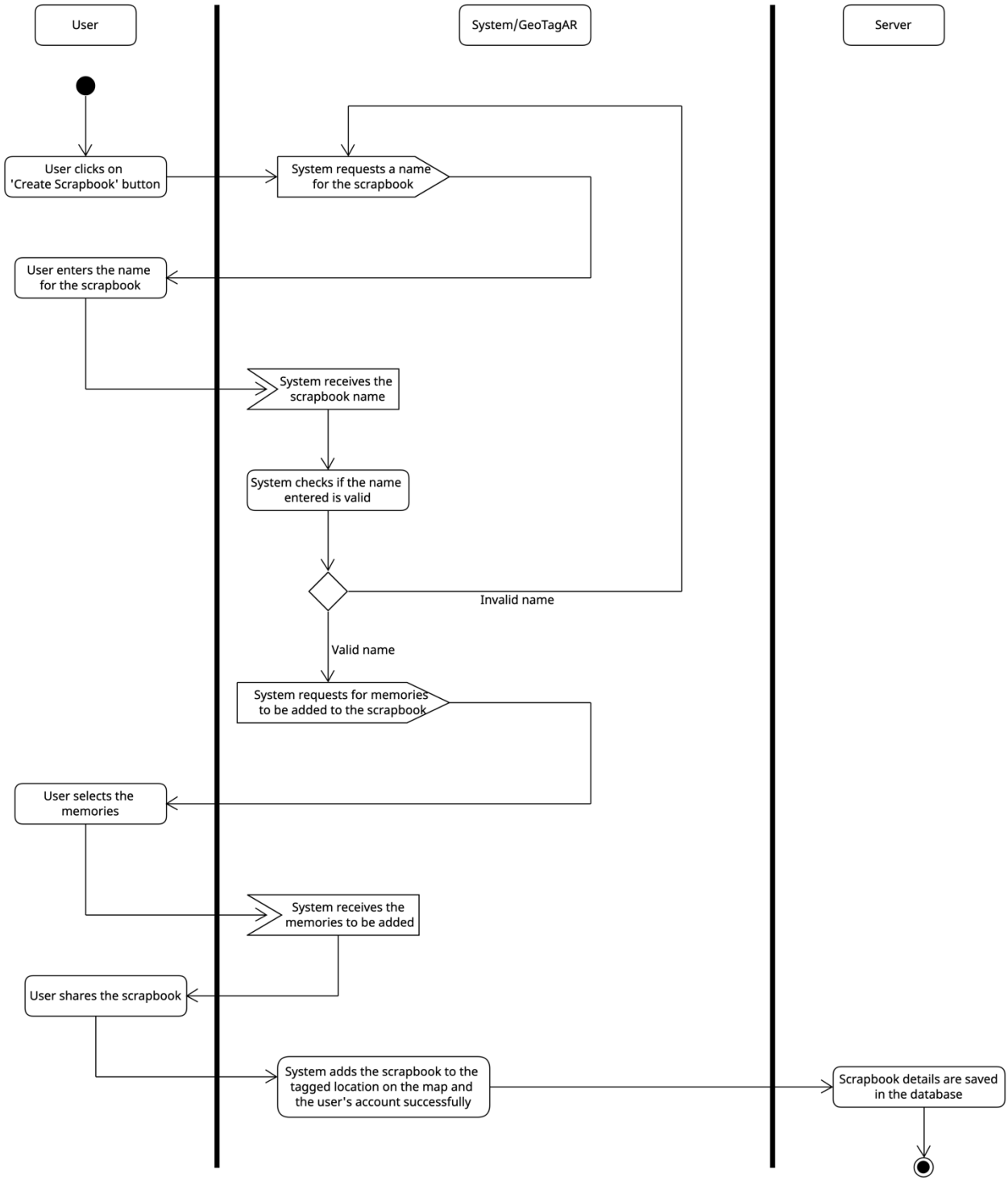


3.6. ACTIVITY DIAGRAM

1. *Creating a memory:*



2. Creating a scrapbook:



4. RISK MANAGEMENT

4.1. RISK IDENTIFICATION

This process allows us to recognize the different risks, causes of the risks and the consequences the risks can have on the software project. We identify the risks into 3 categories – project, product, or business risks. We also note the type of risk, e.g., people, estimation, requirements, technology, etc. This list of risks will set the criteria for the probability of risk and its impact.

ID	Risk	Type	Category
RK-ID1	Time Management Issue with the project	Estimation	Project
RK-ID2	Requirement Changes	Requirements	Project, Product
RK-ID3	Lack of Communication within the team	People	Project
RK-ID4	Loss of any work data	Technology	Project
RK-ID5	Team member leaves the group	People	Project
RK-ID6	Manager's unavailability at important times	People	Project
RK-ID7	Similar Markets with same software/product	Organizational	Business
RK-ID8	Lack of knowledge/skills to implement requirements	People	Project
RK-ID9	Poor interaction with the user-interface	Organizational	Product
RK-ID10	Illness within the team members	People	Project
RK-ID11	Software incompatibility	Technology	Product
RK-ID12	Depreciated software Libraries	Technology	Product
RK-ID13	Financial issues with the organization	Organizational	Business
RK-ID14	Performance in the Database	Technology	Product
RK-ID15	Data breach in different sections of the product	Technology	Product
RK-ID16	Size underestimation of the Software	Estimation	Product, Project
RK-ID17	Server issues	Technology	Product, Business

4.2. RISK ANALYSIS

This is the process which allows us to understand the potential risks, as well as assess their impact on the software. It provides a basis with which we can mitigate risks.

Priority within risks is calculated with the probability and impact giving us a comprehensive view to prevent any value losses.

The probability and impact are measured using a range value from 1 to 5 where each value will represent the type of probability and impact (Appendix 8.2).

ID	Risk	Probability	Impact	Analysis	Risk Priority
RK-ID1	Time Management Issue with the project	High (4)	Catastrophic (5)	Examinations and coursework from other courses can affect the needed time to complete the product before the scheduled end date. In a rare case, extensions within the other coursework can also affect the group schedules.	Critical Priority (20)
RK-ID2	Requirement Changes	Medium (3)	Moderate (3)	Changes within the requirements can be requested to change by the client, it could pose a risk as the client may request a change during a later stage in the development.	Medium Priority (9)
RK-ID3	Lack of communication within the team	Low (2)	Severe (4)	The team is unable to communicate with each other in terms of project delivery as it will have a detrimental effect on the overall success of the project.	Medium Priority (8)
RK-ID4	Loss of any work data	Very Low (1)	Catastrophic (5)	Documentation and important files can be lost due to human error or any source of corruption and viruses. The team productivity will take a hit and can affect the team morale.	Medium Priority (5)
RK-ID5	Team member leaves the group	Very Low (1)	Moderate (3)	At any point in the stage, a team member can leave the group before the project is even finished.	Low priority (3)
RK-ID6	Manager's unavailability at important times	Very Low (2)	Moderate (3)	During the end date for any stage, the manager may be unavailable to clear any queries or assist in the project.	Medium Priority (6)
RK-ID7	Similar markets with the same product/software	Medium (3)	Moderate (3)	Other AR products can be found online which could have the same function and objectives with our product.	Medium Priority (9)
RK-ID8	Lack of knowledge/skills	Low (2)	Minor (2)	Certain requirements are harder to implement than the rest, a team member or the whole team could face issues implementing it as it may require a more advance skill.	Low Priority (4)
RK-ID9	Poor interaction with the user-interface	Medium (3)	Catastrophic (5)	The users in the testing phase and the client may not find the user experience engaging. The AR software interactivity needs to be smooth for the user to utilize it with ease. The team will also	High Priority (15)

				need to alter the UI/UX design until the client or users are satisfied.	
RK-ID10	Illness within the team members	Low (2)	Severe (4)	A team member can fall ill at any point.	Medium Priority (8)
RK-ID11	Software incompatibility	Low (2)	Moderate (3)	Software can turn out to be incompatible due to initial choices and lack of knowledge.	Medium Priority (6)
RK-ID12	Deprecated software libraries	Very Low (1)	Severe (4)	Any open-source software library used could be outdated/unsupported leaving the product vulnerable to any source of attacks. Additionally, the lack of support would result in newer libraries not being compatible with the deprecated libraries.	Low Priority (4)
RK-ID13	Financial issues with the organization	Very Low (1)	Severe (4)	The cost and funds for the whole project can be very large as the tools and software development toolkits for the AR can exceed the budget.	Medium priority (5)
RK-ID14	Performance in the database	Low (2)	Moderate (3)	The database can run slow due to either internal or external issues. This can slow down the performance of the application.	Medium Priority (6)
RK-ID15	Data breach in different sections of the product	Very Low (1)	Catastrophic (5)	Personal information including the login page can be hacked. Sections within the database can be vulnerable leading to any account data being stolen as it may not be encrypted well and can also be due to the lack of consistency when monitoring the database.	Medium Priority (5)
RK-ID16	Size underestimation of the software	Low (2)	Catastrophic (5)	A lot of features are needed for the product to fully function properly with the AR implementations, The size of the whole system needed can be larger than what we expected	Medium Priority (10)
RK-ID17	Server Issues	Medium (3)	Severe (4)	Any issues including sudden crashes, server lag, power outages etc., can affect the end-users with problems and the load times will increase. It can negatively affect the business reputation.	High Priority (12)

4.3. RISK PLANNING

ID	Risk	Strategy
RK-ID1	Time Management Issue with the project	Document finished tasks, roadblocks, and timeframes.
RK-ID2	Requirement Changes	Assess changed requirements' impact using traceability information
RK-ID3	Lack of Communication within the team	Team members must have a strict meeting schedule. This ensures participation, communication, and builds cohesion within the team. Any external factors affecting a team member must be informed to the rest of the team.
RK-ID4	Loss of any work data.	Secure a copy of the project and documentation elsewhere.
RK-ID5	Team member leaves the group.	Remaining team members must equally allocate the leaving members' tasks between each other, while ensuring the project is on-track to be completed by the due date.
RK-ID6	Manager's unavailability at important times.	Most doubts should be solved during pre-scheduled meetings with the line manager. In case of external factors affecting the line-manager and preventing communication, the team can coordinate with the group project coordinator.
RK-ID7	Similar Markets with same software/product.	Adequate research on other similar types of products should be performed to ensure the product is unique to some extent.
RK-ID8	Lack of knowledge/skills.	Team members should acknowledge their strengths and weaknesses and adapt accordingly. Additionally, the readiness to learn new topics should be adopted.
RK-ID9	Poor interaction with the user-interface.	Test the product with large user groups. Feedback from the users will be used to enhance the existing user-interface.
RK-ID10	Illness within the team members.	Restructure the team to ensure team members' understanding of each other's role in the project
RK-ID11	Software incompatibility.	The product must be vigorously tested on all platforms developed on in order to wean out incompatibilities. Additionally, all dependencies must be updated and repeatedly tested.
RK-ID12	Deprecated software Libraries.	Deprecated software libraries should not be used due to the complexity and longevity aspect of the product. In cases where no alternative is available, use of deprecated libraries must be mentioned beforehand.
RK-ID13	Financial issues with the organization.	A justified project cost must be presented to the line manager. In the case of rejection, the team must adapt and look for open source/free alternatives.
RK-ID14	Performance in the Database.	A proven and certified database must be used for the product. Additionally, files must be optimized to before being stored.
RK-ID15	Data breach in different sections of the product.	The product must be tested for data security by attempting possible known breaches. Must encrypt all

		the stored data to protect the privacy of users while also ensuring security of the database.
RK-ID16	Size underestimation of the Software.	The team should be willing to reduce features for the product launch in exchange for completion of the project and a bug-free experience. Features omitted during launch can be added later.
RK-ID17	Server issues.	Backup servers must be available to maintain minimum downtime. Must be able to roll-back to the previous stable version if any problem were to occur

4.4. RISK MONITORING

In the risk monitoring process, each risk is regularly evaluated with a just strategy in order to assess the probability and likelihood of the risk occurring. The table below indicates the risk type and potential indicators. This is further expanded upon later, where each risk's potential indicators have been highlighted.

Risk type	Potential Indicators
Technology	Reports of technology problems, late delivery of software
People	Poor relationships amongst team members, lack of morale
Organization	Lack of action by senior management, gossip within organization
Tools	Demands for more sophisticated workstations, reluctance by team to use certain tools
Requirements	More requests to change requirements, complaints from client
Estimation	Failure to combat reported defects, failure to comply with agreed schedule

The table below highlights potential indicators for each risk.

ID	Risk	Potential Indicators
RK-ID1	Time Management Issue with the project	Team members should be aware of time constraints and manage their time accordingly. Additionally, missed deadlines and lack of progress must be taken into account.
RK-ID2	Requirement Changes	Team members must look for signs of inadequate or extra requirements, which might affect future development. Accordingly, the requirements must be adjusted to best fit the product's needs.
RK-ID3	Lack of Communication within the team	Team members must look for signs such as lack of communication from a team member(s), unusually slow progress, missed deadlines, and confusion between team members' responsibilities. These signs need to be brought up and resolved in group meetings.
RK-ID4	Loss of any work data.	Team should ensure that software such as Word is correctly documenting the progress. Version control

		must be used at all times, in addition to storing a secure copy in an external drive.
RK-ID5	Team member leaves the group.	Each member should actively monitor their current situation and look for signs of things which might force them to leave the group. Accordingly, the member should communicate this to the team.
RK-ID6	Manager's unavailability at important times.	Team members must look for signs of the manager taking either a long time to respond or not responding at all. Accordingly, the team should communicate with the project coordinator on future steps.
RK-ID7	Similar Markets with same software/product.	Team members must look for signs of their ideas being similar to existing products. Accordingly, the ideas should be modified and enhanced to be distinct.
RK-ID8	Lack of knowledge/skills.	Team members must look for signs of confusion during development. *Development* includes document development as well as application development. Accordingly, the team should polish their development related skills.
RK-ID9	Poor interaction with the user-interface.	Team members must look for signs of user dissatisfaction while using the product. Additionally, an increase in user difficulty in using the interface must be reported back to the team.
RK-ID10	Illness within the team members.	Team members must look for signs of sickness within themselves. It is the responsibility of the member to communicate any issues with their health with the rest of the team.
RK-ID11	Software incompatibility.	Team members must actively look for incompatibility with certain software. Accordingly, the incompatibility should be ironed out.
RK-ID12	Deprecated software Libraries.	Team members must actively look for usage of libraries with lack of adequate support. Accordingly, libraries must be updated or replaced, in order to avoid problems further down the road.
RK-ID13	Financial issues with the organization.	Team members must look for signs of inadequate development resources. Accordingly, these signs need to be discussed with the line manager on how to mitigate the risk.
RK-ID14	Performance in the Database.	Team members must look for signs of inadequate speed, unreliability, and inefficiency in their database provider.
RK-ID15	Data breach in different sections of the product.	Team members must regularly check the product for vulnerabilities. Accordingly, detected vulnerabilities must be patched.
RK-ID16	Size underestimation of the Software.	Team members must look for signs of unwanted requirements. Accordingly, requirements must be reworked in order to ensure the completion of the project.
RK-ID17	Server issues.	Team members must look for signs of inadequate speed, unreliability, and inefficiency in their server provider.

5. PROJECT DECISIONS AND PLAN

5.1. SOFTWARE

Development

The software(s) used for developing the application mainly consist of Google's *ARCore*, *Unity*, Meta's *React Native* and *Firebase*.

The website for the application will be developed using HTML, CSS & React.

ARCore was primarily chosen due to a feature called persistent *Cloud Anchor*. A cloud anchor is a special type of anchor, which ensures the persistence of AR objects/experiences in the real world, e.g., Storing AR-based details about a specific location in the real world, which other users can access by going to that location.

React Native will be used to create a seamless and interactive user-interface (UI). Additionally, this enables the team to build the UI for both iOS and Android through JavaScript, without having to separately develop applications for each operating system.

As for Unity, their cross-platform framework *AR Foundation* will allow the team to develop AR experiences for both iOS and Android operating systems, without any additional modifications. Accordingly, ARCore's optional ARCore extensions will be implemented in order to enhance and add extra functionality to the application development process.

Prototyping

The software being used for developing the mock-ups/prototypes is Figma, a collaborative tool for interface design, etc. Figma was chosen over Adobe XD primarily due to Figma's flexible accessibility i.e., files can be accessed through any compatible web browser, compared to the contrary, which requires the desktop application.

Database

For the backend, the optimal choice was Firebase (perhaps with nodeJS), a cloud-hosted database. Firebase will be used to store user information such as personal information, authentication, uploaded media, etc.

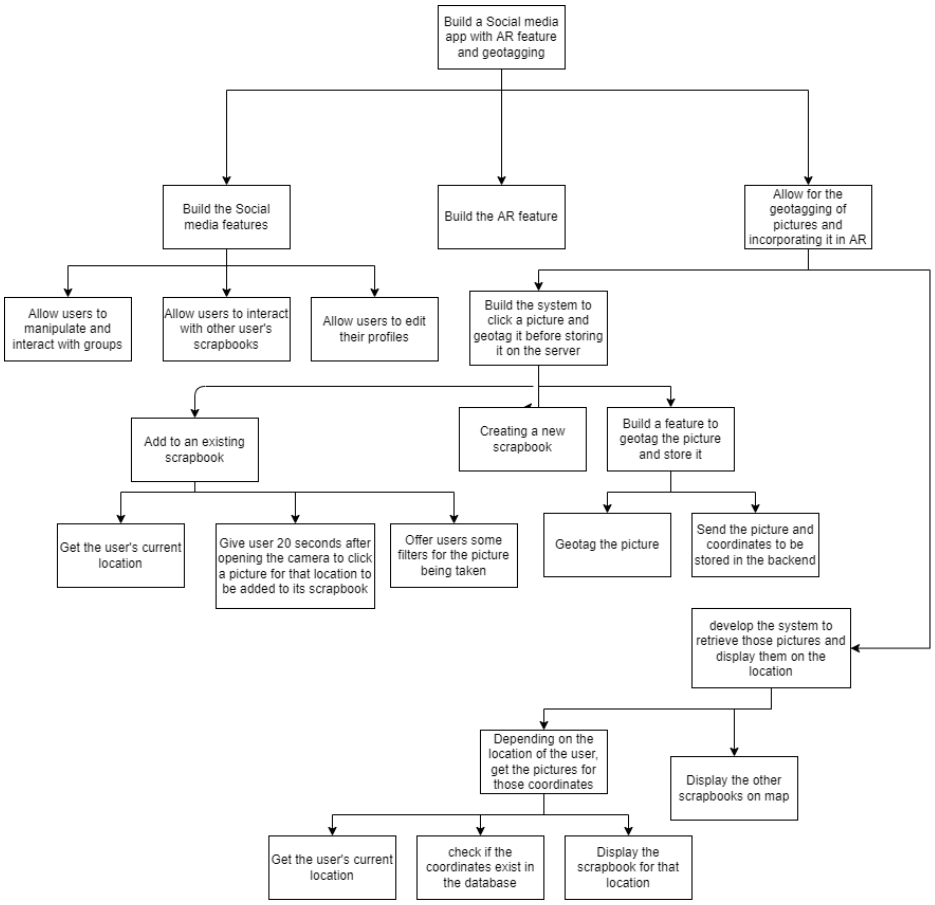
5.2. SOFTWARE PROCESS

We are following an Iterative Incremental Development Process for our project.

Iterative development and Incremental development are some of the popular approaches of the Phase Development Process, which aims to reduce the cycle time.

In this type of Software Process, the requirements are broken down by functionality into subsystems, called increments (each increment delivering a functionality of the system). Each increment is developed in one iteration and at the end of each iteration, it is tested and integrated into the system.

5.3. SUB-SYSTEM DIVISION



5.4. PRODUCT ASSESSMENT

There are 3 main points to be assessed, namely product usability, technical correctness, and customer expectations.

Product Usability

Assessments for product usability will be completed online using Microsoft Forms. This will enable the team in gathering analytics, which will further highlight preferred sections as well as areas requiring rework. Additionally, the use of prototypes will enhance the obtained analytics and assist in evaluating the progress and direction of the product, all while providing customers with a better understanding of the final product.

Technical Correctness

In order to ensure optimal technical correctness, the product will be thoroughly tested through testing types such as unit testing, performance testing, functional testing and more. This will assist in eliminating bugs and ensure the proper function of the app.

Customer Expectations

Customer expectations will primarily be assessed through questionnaires and surveys paired with prototype models. Additionally, meetings with the client, line manager and course coordinator will further assist in pinpointing the expected functionality of the product. The specification provided by the client will be thoroughly analyzed, which will ensure the understanding of the problem space.

5.5. TEAM ROLES & COLLABORATION

The team will collaborate through a mixture of in-person meetings as well as virtual meetings primarily through Microsoft Teams. Accordingly, documents and code will be stored on platforms which allow users to collaborate in real-time, such as Microsoft Word, GitHub, Figma, etc. In addition to the above, as a risk management strategy, local backups of documents and code will be made at set intervals.

Furthermore, Jira by Atlassian will be used to track sprints and allow agile project management.

In case a member is unavailable for a meeting, they can refer to the project diary for the minutes of meeting of the missed meeting.

The expected contribution of each team member based on their strengths and abilities are listed below:

Name	Primary Contribution
Aamir Nazir	Technical Manager, Database Administrator, Full Stack Developer
Gauri D Revankar	Organizational Manager, Liaison, Front-end Developer
Ismael Shaikh	Technical Manager, Reporter, Full Stack Developer

Jacinth Daniel Moses	Lead Developer, Liaison, Full Stack Developer
Praveen Venkataraman	Quality Assurance Engineer, Web Designer
Rylan Chris Silveira	Front-end Developer, Tester
Sanjeevani Rajpurohit	Front-end Developer, Web Designer
Tejas Syam	Risk Manager, Tester

5.6. DEVELOPMENT METHODOLOGY

We adopted an **Agile Scrum Methodology** for the project.

Such a methodology values individuals and interactions over processes and tools. Late changes are responded to quickly without excessive rework. We didn't have a clear idea of the requirements of the system when we first started with the project and added new requirements to the list as we progressed.

The clients are an integral part of the development process and closely work with the developing team. We frequently contacted our line manager to evaluate our increments and to ensure whether we understood the requirements of the client correctly.

Such a methodology is preferred for a small team with co-located members. We conducted face-to-face meetings (daily standup meetings) for five to ten minutes every day to update each other with the individual progress and the difficulties they faced. Our team leader was designated the role of the scrum master who communicated with our line manager to remove the roadblocks whenever the team faced any.

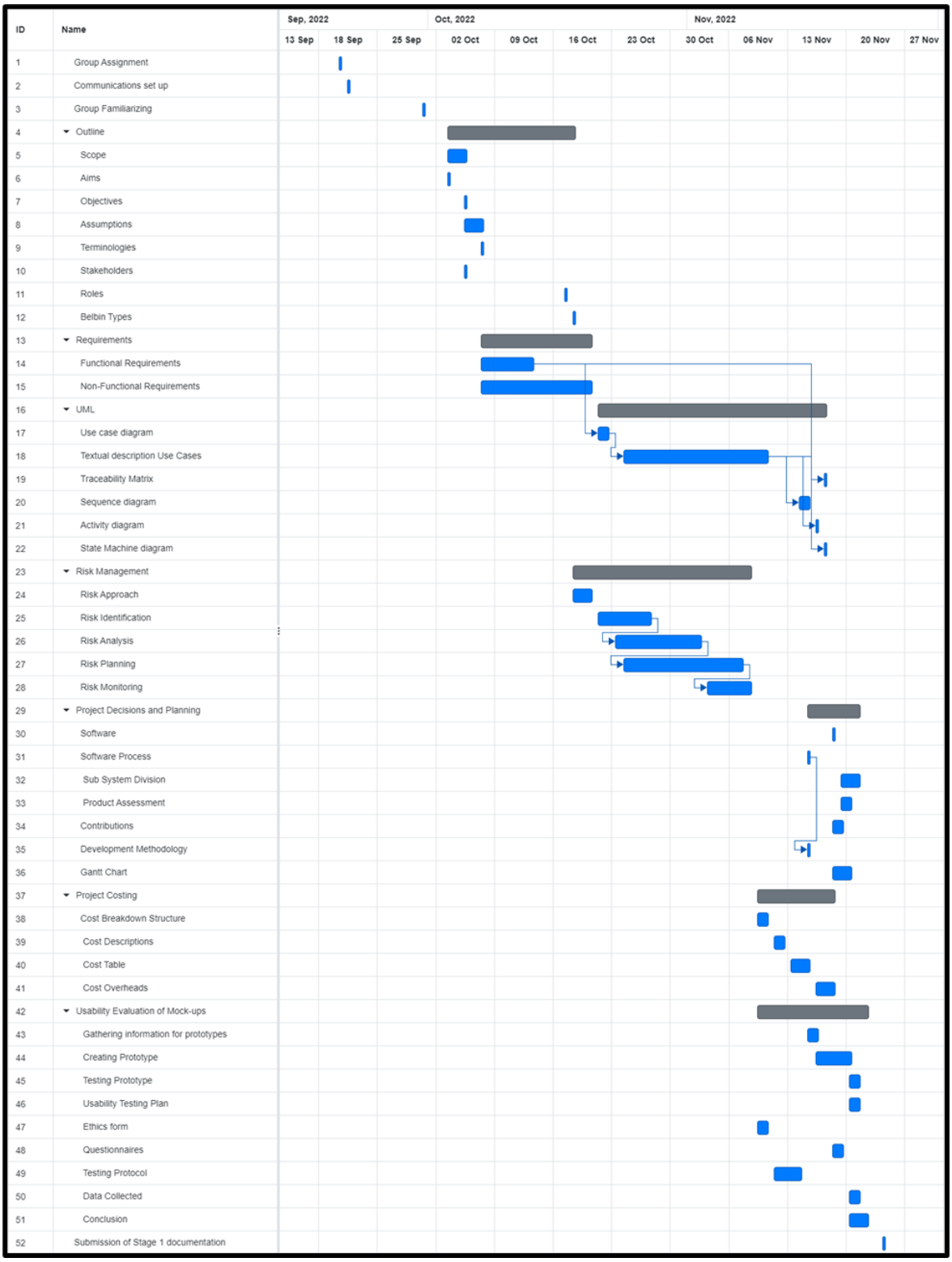
The roles have been assigned as follows:

Scrum Master - **Gauri R.** Scrum Team - All other 7 members

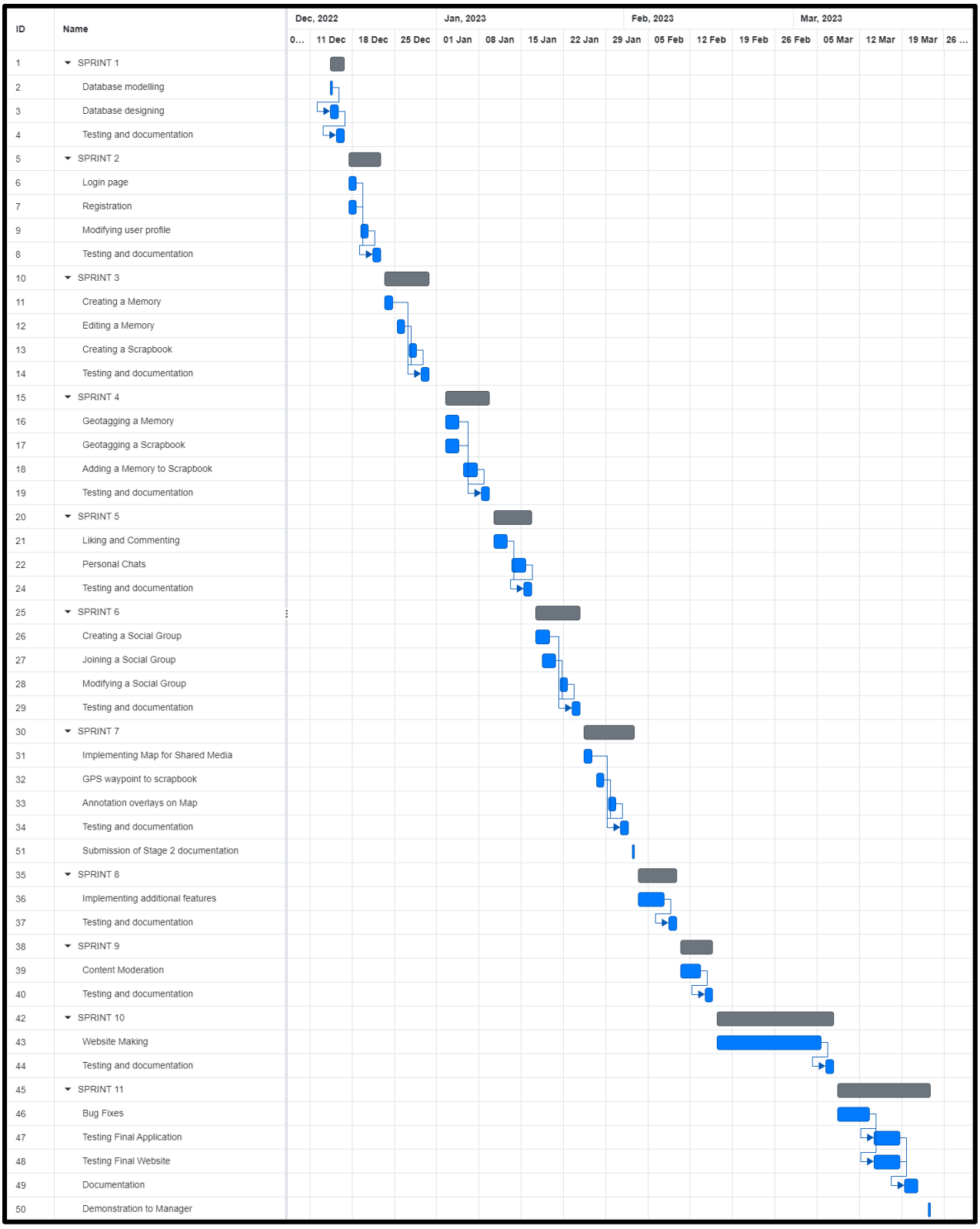
Product Owner – **Abbasi, Ubaid (Proxy customer)**

5.7. GANTT CHARTS

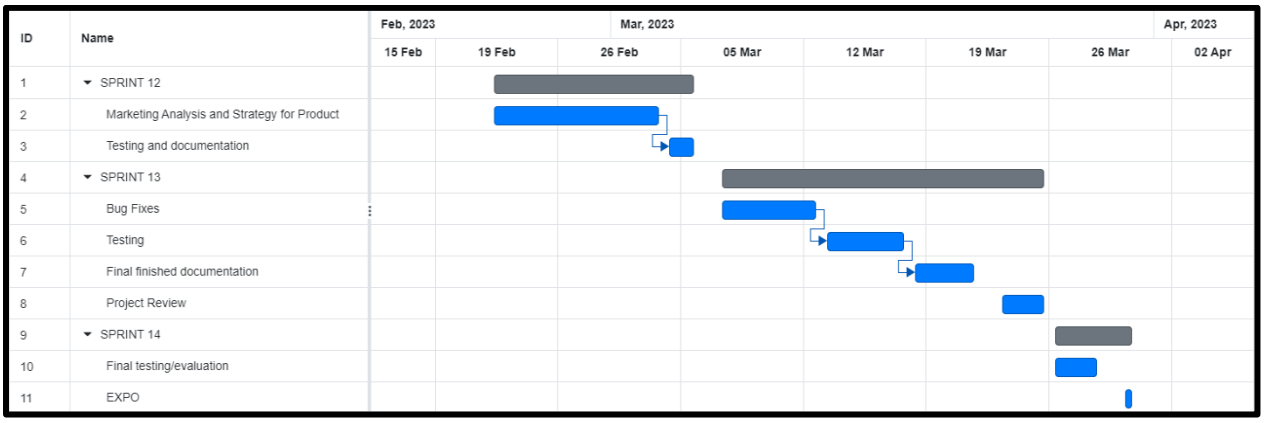
Stage 1



Stage 2


ID
Name
Dec, 2022
Jan, 2023
Feb, 2023
Mar, 2023
0...
11 Dec
18 Dec
25 Dec
01 Jan
08 Jan
15 Jan
22 Jan
29 Jan
05 Feb
12 Feb
19 Feb
26 Feb
05 Mar
12 Mar
19 Mar
26 ...
1 SPRINT 1
2 Database modelling
3 Database designing
4 Testing and documentation
5 SPRINT 2
6 Login page
7 Registration
9 Modifying user profile
8 Testing and documentation
10 SPRINT 3
11 Creating a Memory
12 Editing a Memory
13 Creating a Scrapbook
14 Testing and documentation
15 SPRINT 4
16 Geotagging a Memory
17 Geotagging a Scrapbook
18 Adding a Memory to Scrapbook
19 Testing and documentation
20 SPRINT 5
21 Liking and Commenting
22 Personal Chats
24 Testing and documentation
25 SPRINT 6
26 Creating a Social Group
27 Joining a Social Group
28 Modifying a Social Group
29 Testing and documentation
30 SPRINT 7
31 Implementing Map for Shared Media
32 GPS waypoint to scrapbook
33 Annotation overlays on Map
34 Testing and documentation
51 Submission of Stage 2 documentation
35 SPRINT 8
36 Implementing additional features
37 Testing and documentation
38 SPRINT 9
39 Content Moderation
40 Testing and documentation
42 SPRINT 10
43 Website Making
44 Testing and documentation
45 SPRINT 11
46 Bug Fixes
47 Testing Final Application
48 Testing Final Website
49 Documentation
50 Demonstration to Manager

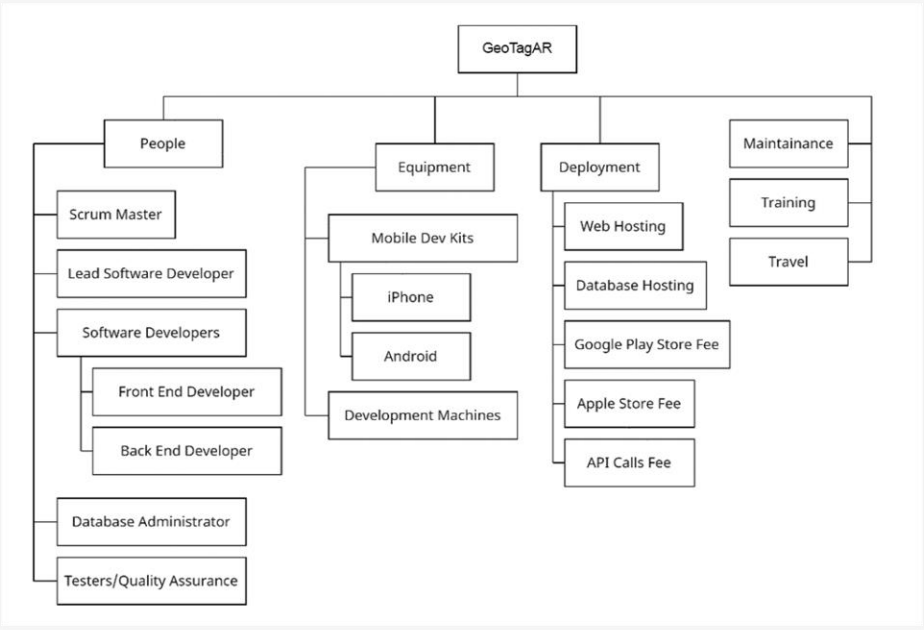
Stage 3



- *Data extrapolated from 8.3*

6. PROJECT COSTING

6.1. COST BREAKDOWN STRUCTURE



6.2. COST DESCRIPTIONS

People: 150 Total working hours (15 Weeks), 10 hours a week:

1. *Scrum Master = The member of staff responsible for ensuring scrum practices are enacted and takes care of external factors/interferences.*
2. *Lead Software Developer = A software developer with a few more responsibilities, such as reviewing code.*

3. *Software Developers*
   a. *Front End Developer = responsible for designing and implementing the front-end UI/UX of the app and website.*
   b. *Back End Developer = responsible for creating back-end infrastructure that makes the app/website function.*
4. *Database Administrator = responsible for making efficient 3NF databases which can be accessed by the backend.*
5. *Testers/Quality Assurance = responsible for providing useful and objective insight as well as finding bugs in the product.*

Equipment:

1. *Mobile Dev Kits*
   a. *iPhone = IOS testing device to ensure App works as intended on platform.*
   b. *Android = Android testing device to ensure App works as intended on platform.*
2. *Development Machines = Machines the developers can use to create the product, iMacs.*

Deployment:

1. *Web Hosting = The cost of deploying the website on a monthly basis*
2. *Database Hosting = The cost of a firebase database on a monthly basis*
3. *Google Play Store Fee = one-time payment for a google developer account to post the app in the play store.*
4. *Apple Store Fee = monthly cost of listing an app in the apple app store.*
5. *API Calls Fee = the monthly fee of any API'S the project might use.*

Maintenance: The cost of maintaining the software:

1. *ensuring the app works on new platforms.*
2. *replacing depreciated libraries*

Training: cost of training the client's staff:

1. *ensure they can do basic trouble shooting*

Travel: the cost of travelling to and from the office to test the geolocation features for 4 employees.

6.3. COST TABLES

SALARIES/PEOPLE	UNITS/ HOURS	NO. OF STAFF	HR/ RATE	COST PER PERSON	COST WITH OVERHEAD PER PERSON	TOTAL COST
Scrum Master	30	1	AED 126.25	AED 3787.50	AED 5681.25	AED 5681.25
Lead Software Developer	140	2	AED 209.34	AED 29307.60	AED 43961.40	AED 87922.80
Software Developer						
Front End Developer	140	2	AED 57.39	AED 8,034.60	AED 12051.90	AED 24103.80
Back End Developer	140	2	AED 53.45	AED 7483.00	AED 11224.50	AED 22449.00
Database Administrator	20	1	AED 105.00	AED 2100.00	AED 3150.00	AED 3150.00
Testers/Quality Assurance	10	2	AED 16.90	AED 169.00	AED 253.50	AED 507.00
TOTAL	480	10	AED 568.33	AED 50,881.70	AED 76,322.55	AED 143,813.85

EQUIPMENT	UNITS	MONTHS	COST	COST PER UNIT	TYPE	TOTAL COST
Mobile Dev Kits						
iPhone	1	4	AED 330.00	AED 1320.00	RENTAL	AED 1320.00
Android	1	4	AED 291.00	AED 1164.00	RENTAL	AED 1164.00
Development Machines	5	6	AED 412.00	AED 2472.00	RENTAL	AED 12360.00
TOTAL	7	14	AED 1,033.00	AED 4,956.00		AED 14844.00

DEPLOYMENT	UNITS	COST	TYPE	MONTHLY COST
Web Hosting	1	AED 43.33	MONTHLY	AED 43.33
Database Hosting	10 GB	AED 165.27	MONTHLY	AED 165.27
Google Play Store Fee	1	AED 91.82	ONE-TIME	AED 0
Apple Store Fee	1	AED 30.30	MONTHLY	AED 30.30
API Calls Fee	1	AED 100	MONTHLY	AED 100
TOTAL		AED 300.42		AED 208.60

EXTRA COSTS	LENGTH	COST PER PERSON	TOTAL COST
TRAINING	10 DAYS	AED 0*	AED 0*
MAINTAINENCE	12 MONTHS	AED 0*	AED 0*
TRAVEL	30 DAYS	AED 350	AED 1400
TOTAL		AED 350	AED 1400

6.4. COST OVERHEADS

1. *All salaries are multiplied by 1.5 x to cover pension, healthcare, etc.*
2. *Reserves of 20% (x1.20).*
3. *Monthly costs can ramp up as more storage is needed for the firebase database, as well as hosting costs as more users come to the site*

6.5. TOTAL COST

	TOTAL COST
SALARIES	AED 143,813.85
EQUIPMENT	AED 14844.00
DEPLOYMENT	AED 300.42
EXTRA COSTS	AED 1400
INITIAL COST	AED 160,358.27
TOTAL WITH RESERVE	AED 192,429.924
MONTHLY COSTS AFTER	AED 208.42

143,813.85 + 1,400.00 + 14,844.00 + 300.42 = AED 160,358.27 INITIAL COST.

AED 208.42 APROXX. Monthly deployment cost.

AED 160,358.27 * 1.20 = AED 192,429.924 Accounting for reserve of 20 percent.

- *All costs referred from the links at section 8.4*

7. USABILITY EVALUATION OF MOCKUPS

7.1. USABILITY TESTING PLAN

Objective and Aims

The test provided will help us understand how each user from a different perspective examines the system's usability and the design aspect of the product.

Participants will be tasked with observing the given mockup of the product, then answering questions related to its functioning and design. This information will help to make sure that the features and general purpose of the product are in line with client expectations. The main aims of the tests will be to ensure that the participants are able to identify the **purpose** of each mockup, share suggestions about the **design** of the mockup, and evaluate its **navigability** as well.

After completion of the test, user feedback and common issues in the system can be noted.

Participants

The participants chosen must consist of potential users of the platform – such as Geocachers or Historians. However, we must include the average user – who does not conform to the above categories – as well, to observe all possible types of users. The client must also be a participant, as they must be able to check if the overall functionality of the application conforms to what they envisioned. Also, they must fall in the general group of ages 18-65 as per the usability guidelines.

Training

No instructions will be provided on how the system will operate. This is done to allow the participants to envision the purpose of the system through their perspective. They will, however, be given a general idea of the purpose of the system. This will give them a fresh perspective, with which they can provide feedback.

Procedure

Each participant will be directed towards their specific location where each team member of the group will be supervising their respective participant. All the participants will be given a consent form to fill in, which will notify them about the aims and objective of the given test, whilst also giving them the option to opt out if needed. By following the General Data Protection Regulation (GDPR), they will be informed on the collection of specific data needed and ensured that any data provided by the user will be protected and not misused. Video and audio recording will not be used during the testing protocol in order to protect the identity of the participant.

An initial questionnaire will be given before the user gets access to the test protocol in order to collect demographic data. A series of tasks will be given for the users to fulfill, the users will be prompt to finish

the given task on their own. The time completion for any given task will not be analyzed to prevent the participants from rushing the process but to give them the time needed to fully view the user interface and design. The participants will still have the option to ask their respective supervisor in the case where they are unable to complete the given task. The users will also be encouraged to bring up any issues during the test which will enable us to get any subjective qualitative data on the prototype, this is where the supervisor will be given their role to take down any notes from their respective participants. This will end with the user filling in an exit questionnaire to provide the feedback with the questions provided.

A pilot test of the prototype will be done by some of the team members before the initiation of the procedure to ensure that there are no problems within the product side and help us determine if the tasks are clear.

Task scenarios: The test scenarios provided will satisfy the functional and non-functional requirements

No.	Task Scenario	Related Requirements
1.	Login & Sign Up	F-UR-1: ***The user must be able to create an account after providing the following details*** F-UR-2: ***The user should be able to login using the necessary credentials*** ***NF-SR-7: The system should allow users to create an account only if it follows the necessary protocols***
2.	Create Memory/Scrapbook	***F-UR-4: MEMORIES*** *F-UR-4.1 - The user must be able to create a memory.* *F-UR.4.2 - The user must be able to edit a memory* *F-UR-4.3 -The user must be able to share content (photos or videos) as a Memory* ***F-UR-5: SCRAPBOOK*** *F-UR-5.1 - The user must be able to add/remove selected memories to a Scrapbook.* *F-UR-5.2 - The user must be able to create a scrapbook.* *F-UR-5.3 - The user must be able to edit/modify a scrapbook.* *F-UR-5.4 - The user must be able to delete a scrapbook.* ***F-SR-3: The user must have access to the camera*** ***NF-UR-4: The user must be able to remove their memories*** ***NF-UR-7: The user must be able to schedule the date and time for posting a memory***
3.	Location	***F-SR-2: The system must have access to the GPS location of the user***
4.	Feed, Search & Text	***NF-SR-16: Accessibility***
5.	Profile Edit & Settings	***NF-UR-3: Profile Modification*** *NF-UR-3.1 - The user must be able to change the following account details* NF-UR-3.2 - *The user must be able to add a bio/sub-description.* NF-UR-3.3 - *The user must be able to set their preferred visibility on their profile.*
6.	Discovery	***F-UR-6: GROUP*** *F-UR-6.1 – The user must be able to create groups/communities for like-minded people* *F-UR-6.2 – The user must be able to join a group* *F-UR-6.3 – The user must be able to leave a group* *F-UR-6.4 – The user must be able to modify a group* *F-UR-6.5 - The user must be able to delete a group created by them*

A completion rating system will be evaluated at the end of every task scenario question, the ratings are compromised into 3 values which will be noted by the supervisor when the testing protocol takes place:

- *Completed: - The participant has completed the given task independently – i.e., without any assistance from the supervisor.*
- *Completed with Help: - The participant has completed the given task but required some assistance from the supervisor.*
- *Not Completed: - The participant is unable to complete the given task even though they were given a hint or any form of assistance.*

The supervisor will mark the scenario as "Completed" if they deem the participant to have a good understanding of the given task. The goal of the usability test for our prototype is to have all the test case scenarios completed without any required help, but, even if the task is not completed, it would help us understand the flaws in our product.

Goals

The usability goals for each task scenario are evaluated using the Completion rate and the Error free rate, and within these rates, the critical and non-critical errors are factored. **Critical** errors are when the error is a big factor in the task that leads to the user not completing the task given. **Non-critical** error may pose an issue with the task but can still end up being completed in the end.

- *Completion rate: - Indicates the percentage of the participants who can complete a task with no critical errors; non-critical errors do not affect the completion rate.*
- *Error free rate: - Indicates the percentage of completed tasks with no errors at all (Critical and Non-critical errors).*
- *Problem severity: - Prioritizes the changes to be made according to the severity of the problem. This severity will be measured based on 2 metrics – problem frequency and problem impact.*

Frequency classification	*Low*	*Medium*	*High*
% of participants encountering problem	*<=10%*	*11-29%*	*>=30%*

Impact classification	*Low*	*Medium*	*High*
Effect of problem	*Problem is minor, and has minimal effect on task completion*	*Problem causes non-critical error*	*Problem causes critical error*

Below is the link for the prototype created using Figma:

GeoTagAR Prototype

7.2. TESTING PROTOCOL

Test supervisor: _____

Date: _____ Participant ID: _____ Location: _____

Aim

The purpose of the application is to act as a social medium, wherein users can share pictures in the form of a "scrapbook" to show the activities they engage in. Therefore, this test aims to assess how the participants interact with a prototype of the application, and checks whether the general purpose of the application is satisfied to some degree.

Introduction

You will be given a mockup of the system and will be tasked with navigating and using it. Based on these, we will ask certain questions to assess whether you are able to describe the features on the screen. You can use the icons on the page to give yourself an idea.

Using your description of the features, you will be asked to describe how you would perform some tasks and use the features. Your responses to the questions and the actions you take will be monitored – but will not be linked to you. There are no right/wrong answers to this – you can also provide suggestions on certain features that you deem irrelevant/inappropriate to the context. To avoid unwanted influence with the test, the supervisor will provide hints only when asked.

Although your test responses will be linked to the system – it will not be affiliated with the university by any means. If, at any given time, you wish to stop the test, please make the test supervisor aware.

After finishing the test, you will be asked to complete a short (anonymous) questionnaire to collect some feedback about your experience with the mockups.

1. Login & sign-up page

*a) Do you think the **login** page has all the features required?*

- *Yes, all the appropriate features are present*
- *No, some features are absent*
- *Most of the necessary features are absent*

*b) Are you able to **login** and proceed?*

- *Yes*
- *Yes, but with some difficulty*
- *No*

c) *Do you think the **sign-up** page has all the features required?*

- *Yes, all the appropriate features are present*
- *No, some features are absent*
- *Most of the necessary features are absent*

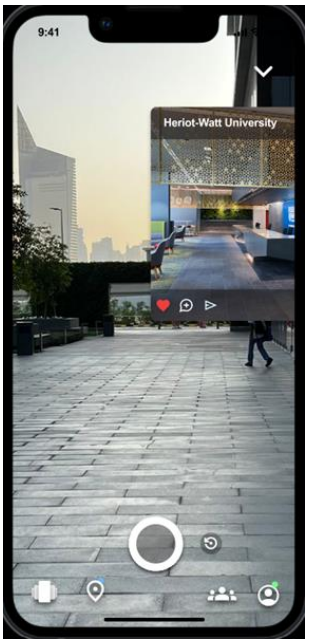
d) *Are you able to return to the **login** page?*

- *Yes*
- *Yes, but with some difficulty*
- *No*

e) *Are you able to **sign up** and proceed?*

- *Yes*
- *Yes, but with some difficulty*
- *No*

2. *Creating Scrapbook*



a) *Are you able to scroll around the environment?*

- *Yes*
- *Yes, but with some difficulty*
- *No*

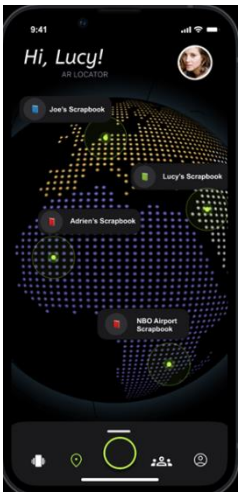
b) *Are you able to take a picture?*

- *Yes*
- *Yes, but it took me a while to figure out how.*
- *No*

c) *Are you able to:*

	Yes	*No*	*Yes, but with some difficulty*
Click on the 'floating' post to view it			
Scroll and view its comments?			

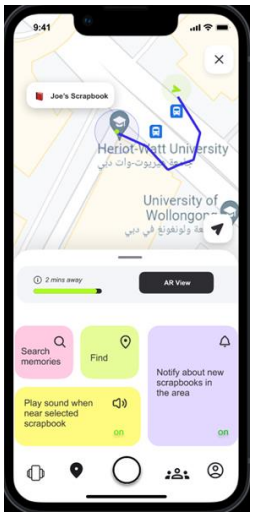
3. Location



a) Can you try to describe this screen?

b) Can you try to click on 'Joe's Scrapbook' to see where the scrapbook is located.

- *I'm able to do it*
- *I took some time to figure it out, but I could do it.*
- *I cannot do it*



c) Can you try to describe the screen?

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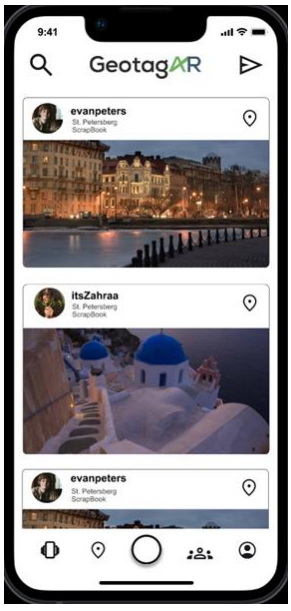
4. *Feed, Search & Text*



a) Upon first glance, do you think you understand all the features on this screen?

- *Yes*
- *Most of them*
- *No*

b) Are you able to scroll through the feeds?

- *Yes*
- *Yes, but it took me a while to figure it out.*
- *No*

c) *Were you able to find the 'Messages' section from the page?*

- *Yes*
- *No*
- *Yes, but it took me a while to find it*

d) *Were you able to find the option to **search for people**?*

- *Yes*
- *No*
- *Yes, but it took me a while to find it*

e) *Can you try clicking on the post to view its comments?*

- *I was able to do it*
- *I could do it after taking some time to figure it out.*
- *I couldn't do it*

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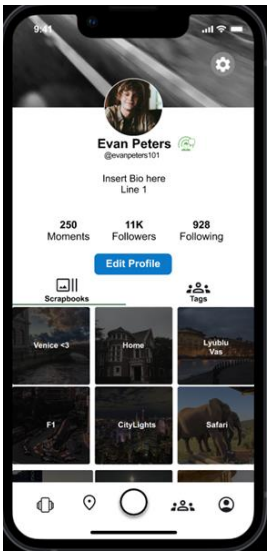
5. ***Profile Edit & Settings***



a) *Can you try to find a way to edit your profile?*

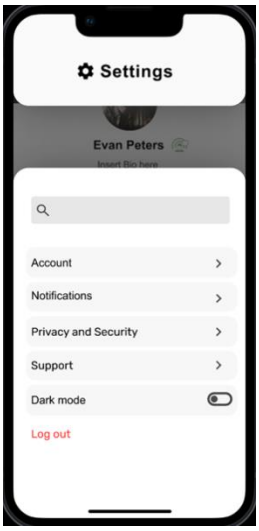
- *I could do it*
- *I could do it, but it took me a while to figure it out.*
- *I couldn't find a way*

b) *Using the same screen, are you able to locate the icon for the settings menu?*

- *Yes*
- *Yes, but it took me a while to figure out how.*

- *No*

c) *Do you think the **Settings** page has all the right categories?*

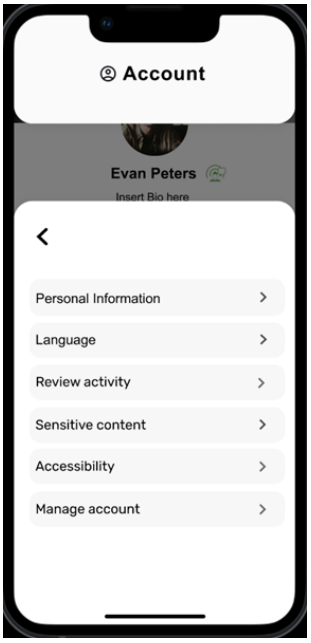


- *Yes, all the appropriate features are present*
- *No, some features are absent*
- *Most of the necessary features are absent*
- *Other*

d) *Are you able to expand into the **account** settings?*

- *Yes*
- *Yes, but it took me a while to figure it out.*
- *No*

e) *Are you able to locate the back button on the screen to return to the **settings** page?*



- *Yes*
- *Yes, but it took me a while to figure it out.*
- *No*

f) *From the **settings** page, try to find a way to go back to the **profile** page*

- *I could*
- *I could, after taking some time to figure it out.*
- *I couldn't*

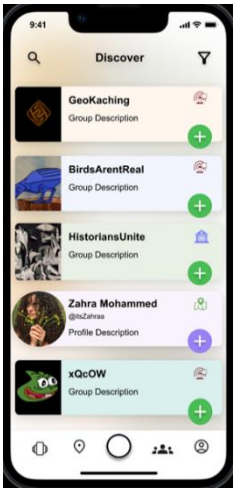
g) *Are you able to expand into the settings of each of these categories?*

	Yes	No	Yes, but with difficulty.
Notifications			

Privacy and Security			
Support			

---

6. Discovery



a) Can you describe what you can see on the screen?

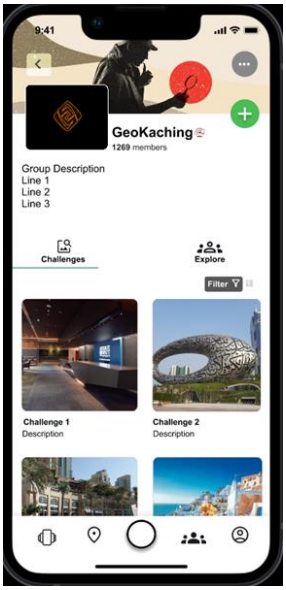
*b) Are you able to **scroll** through the list of groups?*

- *Yes*
- *Yes, but it took me a while.*
- *No*

*c) Are you able to navigate your way into **viewing** a group?*

- *Yes*
- *Yes, but it took me a while.*
- *No*

d) Are you able to do the following actions below?



	Yes	*No*	*Yes, but it took me a while*
*Joining a **Group***			
***Leaving** the group after joining*			
*Going **back** to the discover page*			

e) *As a final question, were you able to use the navigation bar at the bottom of the screen to navigate across different pages?*

- *Yes*
- *No*

7.3. DATA FINDINGS

Initial Questionnaire Findings (Demographic Data)

This includes results from the pre-test questionnaire. All data was made sure to comply with GDPR Standards. Also, the anonymity of all participants was preserved by assigning a unique ID to each participant.

What is your age?	Participants count
18-24	25
25-34	0
35-50	0
51-65	0

What is your gender?	Participants count
Male	**16**
Female	**8**
Non-binary	**0**
Prefer not to say	**1**

How often do you use social media?	Daily	Weekly	Monthly	Never
Participants count	23	2	0	0

Have you heard of the term “Augmented Reality”?	Participants count
Yes	**25**
No	**0**

Testing protocol Findings

Within every task scenario, each participant is provided with a link to review the prototype and to navigate their way through the different sections of the prototype

Login & Sign-up Page

Login Page:
All the participants had agreed that all the necessary features on the login page were present, indicating no issues in terms of user interface.

Task Scenario 1. b) Are you able to login and proceed?
8% of the participants experienced issues trying to login, this could be due to lack of information provided in the usability tests on how to login as users would only need to click the login button without filling in any required details.

Q1B	*Participants Data*
Completed	*23*
Completed with Help	*0*
Not Completed	*2*
Completion Rate	*92%*
Error free Rate	*92%*

Sign-up Page: Some features in the sign-up were lacking according to 16% of the participants. A Terms & Condition agreement was mentioned not to be found in the sign-up process; another common comment brought up was the 2-factor authentication not being implemented which can bring an issue in the security aspect.

Task Scenario 1. d) Are you able to return to the login page?
Most of the participants were able to navigate their way to return to the login page, only 1 participant required assistance in returning to the login page. The navigation within that section can be improved to help users log out.

Q1D	*Participants Data*
Completed	*24*
Completed with Help	*0*
Not Completed	*1*
Completion Rate	*96%*
Error free Rate	*96%*

Task Scenario 1. e) Are you able to sign up and proceed?

All the participants were able to successfully complete the task, there were no problems in signing up in the sign-up section of the page. (One participant could not sign up due to reasons concerning Figma's internal issues)

Q1E	*Participants Data*
Completed	*24*
Completed with Help	*0*
Not Completed	*1*
Completion Rate	*96%*
Error free Rate	*96%*

Creating a Scrapbook

Task Scenario 2. a) Are you able to scroll around the environment?

All the participants completed the task with no issues.

Q2A	*Participants Data*
Completed	*25*
Completed with Help	*0*
Not Completed	*0*
Completion Rate	*100%*
Error free Rate	*100%*

Q2B	Participants Data
Completed	21
Completed with Help	0
Not Completed	4
Completion Rate	84%
Error free Rate	84%

Task Scenario 2. b) Are you able to take a picture?

Almost all the participants were able to complete the task, some users faced difficulties in understanding the navigation of the icon to take a picture.

Task Scenario 2. c) Are you able to:

Click on the 'floating' post to view it?
Scroll and view its comments?

Q2C	Participants Data Q1	Participants Data Q2
Completed	25	21
Completed with Help	0	4
Not Completed	0	0
Completion Rate	100%	100%
Error free Rate	100%	84%

All the participants were able to complete Q1 of the task with no issues, 16% of the participants had issues scrolling and viewing the comment within the post as the Figma application experienced internal issues. Some suggested the size of the comments to be larger for the user to see.

Location

Mainly all of the participants understood the screen to be a map to view all the scrapbooks available in the world, some users believed it was only a worldwide map containing the scrapbooks for 'friends', they compared it to the 'snapchat' map.

Task Scenario 3. B) Can you try to click on 'Joe's Scrapbook' to see where the scrapbook is located

When viewing the screen of a different interface, most of the users understood the interface showcasing the user's map route and the scrapbook destination, while other users had brought up the idea that it was just another map represented in an alternative form.

Q3B	Participants Data
Completed	25
Completed with Help	0
Not Completed	0
Completion Rate	100%
Error free Rate	100%

Feed, Search and Text

Most participants have understood the purpose of the screen – i.e., to give directions to the scrapbook selected by the user. Also, **all** participants were able to scroll through the feed to view other posts.

Task Scenario 4. C) Were you able to find the 'Messages' section from the page?
Task Scenario 4. D) Were you able to find the option to search for people?
Task Scenario 4. E) Try clicking on a post to view its comments.

Q4	*Participants Data Q4C*	*Participants Data Q4D*	*Participants Data Q4E*
Completed	*18*	*20*	*22*
Completed with Help	*6*	*3*	*0*
Not Completed	*1*	*2*	*3*
Completion Rate	*96%*	*92%*	*88%*
Error free Rate	*72%*	*80%*	*88%*

For scenario **4.c**, we see that most participants (72%) were able to find the messages section. However, 6 participants took some time to figure out where it was located. This could've been avoided if we used an appropriate icon to indicate the messages. For scenario **4.d**, 92% of participants were able to search for people, with only 2 participants not being able to search due to internal issues within Figma. For scenario **4.e**, only 3 participants were not able to view a post's comments – this is probably since the comments were hidden, and the participants were not aware that they had to scroll to find them.

Profile Edit & Settings

Task scenario 5. a) Can you try to find a way to edit your profile?

All the participants were able to edit the profile giving us insight that the layout and design of the interface was sufficient.

Q5A	*Participants Data*
Completed	*25*
Completed with Help	*0*
Not Completed	*0*
Completion Rate	*100%*
Error free Rate	*100%*

Task scenario 5. b) Using the same screen above, are you able to locate the icon for the settings menu

All the participants were able to locate the settings menu, the data received proves the icon and the visibility for the layout is ideal

Q5B	*Participants Data*
Completed	*25*
Completed with Help	*0*
Not Completed	*0*
Completion Rate	*100%*
Error free Rate	*100%*

Task Scenario 5. d) Are you able to expand into the Account settings?

All of the participants were able to complete the task indicating no issues were found within that section

Q5D	*Participants Data*
Completed	*25*
Completed with Help	*0*
Not Completed	*0*
Completion Rate	*100%*
Error free Rate	*100%*

Task Scenario 5.e) Are you able to locate the Back button on this screen to return to the settings page?

Task Scenario 5.f) From the settings page, try to find a way to go back to the profile page.

Q5	*Participants Data Q5E*	*Participants Data Q5F*
Completed	*24*	*24*
Completed with Help	*0*	*0*
Not Completed	*1*	*1*
Completion Rate	*96%*	*96%*
Error free Rate	*96%*	*96%*

Majority of participants were able to successfully complete the task, there were no obvious problems encountered. Some participants encountered errors primarily due to Figma.

In the settings page, the users were asked to see if the page had all the categories, 8% of the participants had responded with not all the appropriate categories present. The users suggested adding a 'Submit Feedback' feature for the users to provide feedback when using the app.

DISCOVERY

Task Scenario 6.b) Are you able to scroll through the list of groups?

All participants were able to successfully complete the task, there were no obvious problems encountered.

Task Scenario 6.c) Are you able to navigate your way into viewing a group?

All participants were able to successfully complete the task, there were no obvious problems encountered.

	Participants Data Q6B	*Participants Data Q6C*
Completed	*25*	*25*
Completed with Help	*0*	*0*
Not Completed	*0*	*0*
Completion Rate	*100%*	*100%*
Error free Rate	*100%*	*100%*

Task Scenario 6.d) Are you able to:

Majority of participants were able to successfully complete the task, there were no obvious problems encountered. Some participants encountered errors primarily due to Figma.

Joining the group
Leaving the group after joining
Going **back** to the discover page

	Participants Data Q1	*Participants Data Q2*	*Participants Data Q3*
Completed	*25*	*23*	*25*
Completed with Help	*0*	*0*	*0*
Not Completed	*0*	*2*	*0*
Completion Rate	*100%*	*92%*	*100%*
Error free Rate	*100%*	*92%*	*100%*

Task Scenario 6.e) Were you able to use the navigation bar at the bottom of the screen to navigate across the different pages?

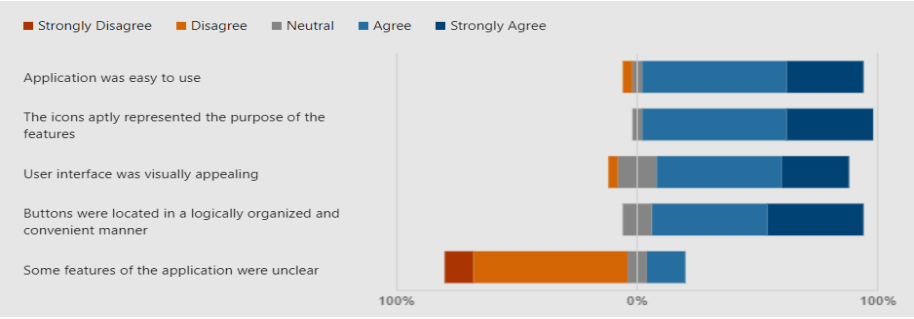
Most participants were able to successfully complete the task, there were no problems in being able to use the navigation bar. across the different pages. Some participants encountered errors, primarily due to Figma.

Q6E	*Participants Data*
Completed	*23*
Completed with Help	*0*
Not Completed	*2*
Completion Rate	*92%*
Error free Rate	*92%*

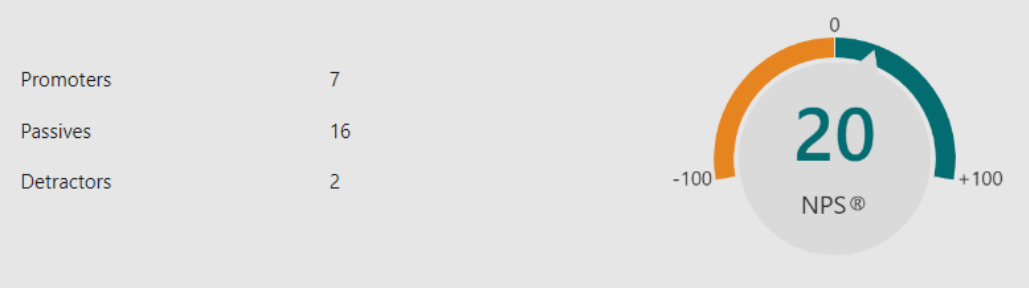
<u>Post-Questionnaire Data Finding</u>

Most users loved the AR feature displayed in our mock-up. They loved how the users could capture posts from a virtual location. “I liked the AR feature where I could view the location as if I was there itself”. Besides this the users also found the scrapbooks to be very neat and loved the way users can leave landmarks online.

Most users found the mock-up to be flawless and really liked all the features although some users felt that they would’ve loved to see a dark mode all throughout the mock-up and not just the settings. A user also wished the home page was a little more colorful.



The overall experience of the prototype was considered a success as most of the users gave a high rating, we can denote that the users did enjoy using the prototype and liked the product. This gives a promising future for the project, and we will start to make improvements as more updated prototypes are being implemented.



7.4. CONCLUSION

The usability test has brought us attention towards the issues of the prototype. These issues would be identified within the sub requirements as not all the functionalities were implemented in the prototype. Comments about the design and features were mentioned in the questionnaires. Overall, the completion of the task scenarios was high with minimal errors within the tasks. The given feedback will help us improve the product and the application for the users.

Agreed Changes

Sign up page

- Include more options such as 2FA and allow for google, email, biometric, etc. login to -account. Also include privacy policy and terms & conditions.

AR View

- Include more real time camera options for users to use and enhance their memories.

Settings page

- Change the UI to a traditional settings page.

Home feed

- Hint the user to scroll/swipe down and view comments when viewing a post.
- The default size of comments should be larger.
- Modify color scheme and UI to keep users engaged.

Discover Page

- Group items based on their type i.e., group, profile, event, challenges, etc.

8. APPENDIX

8.1. TERMINOLOGY/ACRONYMS

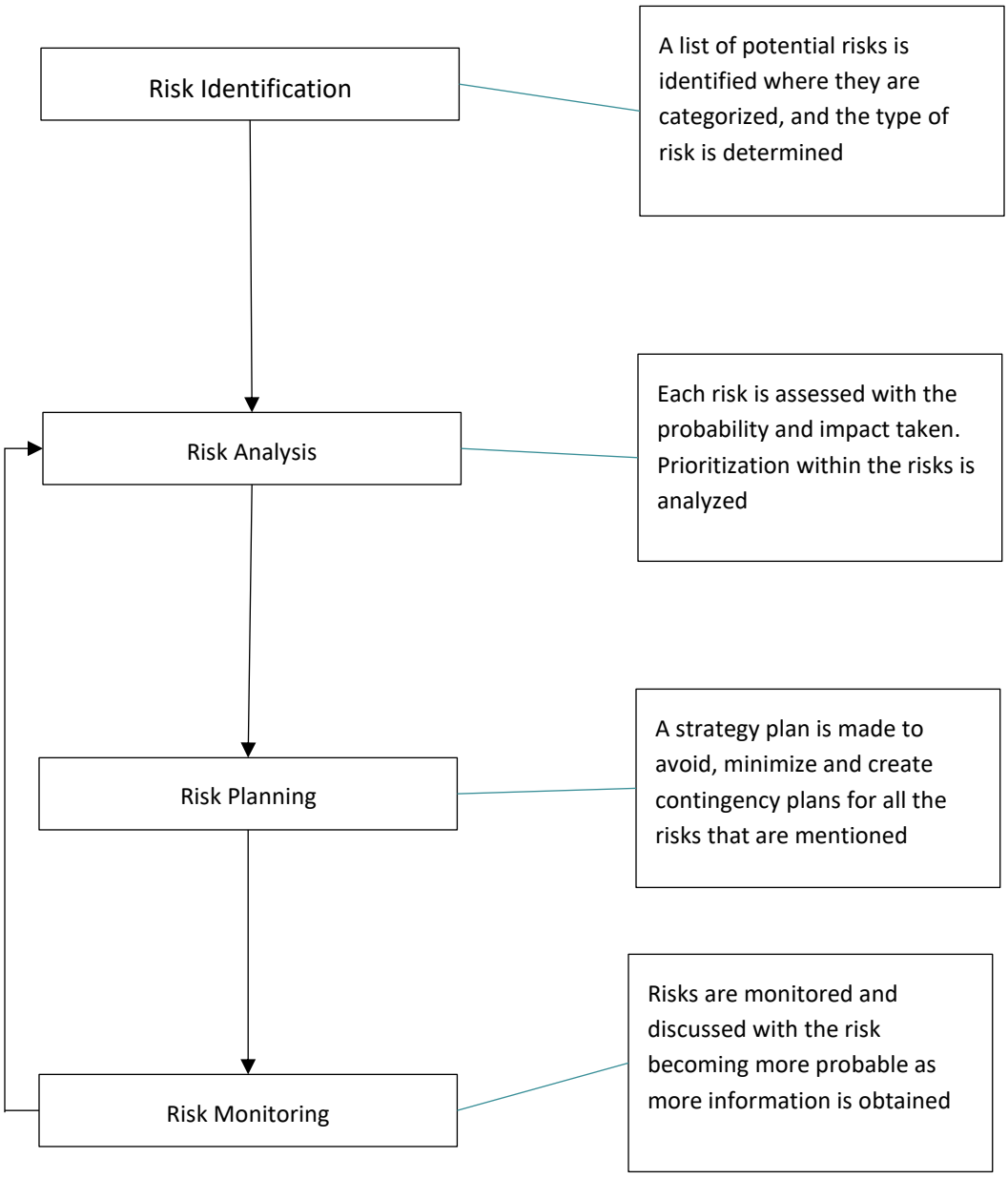
- *Terminology for section 2*

Acronym	Description
F - UR	*Functional - User Requirement*
NF - UR	*Non-Functional - User Requirement*
F - SR	*Functional - System Requirement*
NF - SR	*Non-Functional - System Requirement*
M	*Must*
S	*Should*
C	*Could*
W	*Won't*
RK - ID	*Risk - Identification*

8.2. RISK ANALYSIS

- *Terminology for section 4*
- *The approach taken towards the risks included in this scenario will be formulated in 4 steps.*
    - ***Risk Identification → Risk Analysis → Risk Planning → Risk Monitoring***

-



Probability:

Probability	Value	Description
Very Low	1	Risk event not expected to occur
Low	2	Risk event less likely than not to occur
Medium	3	Risk event may or may not occur
High	4	Risk event more likely than not to occur
Very High	5	Risk event expected to occur

Impact:

Impact	Value	Description
Negligible	1	No or insignificant impact on the project
Minor	2	Very little impact on the project
Moderate	3	Impacts the project but can be resolved
Severe	4	High impact on the project
Catastrophic	5	Can lead to a project failure

Risk Matrix:

RISK MATRIX		Impact				
		Negligible (1)	Minor (2)	Moderate (3)	Severe (4)	Catastrophic (5)
Probability	Very High (5)	5	10	15	20	25
	High (4)	4	8	12	16	20
	Medium (3)	3	6	9	12	15
	Low (2)	2	4	6	8	10
	Very Low (1)	1	2	3	4	5

Risk Matrix Score	Risk priority category
1 - 4	Low Priority
5 - 10	Medium Priority
11 - 18	High Priority
19 - 25	Critical Priority

8.3. GANTT CHART

- *Terminology for section 5*

STAGE 1

Topic	No. of days	Start Date	End Date	Contributors
Stage 1	**66**	**20/09/2022**	**24/11/2022**	**All**
SPRINT 0	**66**	**20/09/2022**	**24/11/2022**	**All**
Group Assignment	1	20/09/2022	20/09/2022	-
Communications set up	1	21/09/2022	21/09/2022	Daniel

Group Familiarizing	1	30/09/2022	30/09/2022	All
Outline	**16**	**03/10/2022**	**09/10/2022**	**All**
Scope	3	03/10/2022	05/10/2022	Ismael
Aims	1	03/10/2022	03/10/2022	Ismael
Objectives	1	05/10/2022	05/10/2022	All
Assumptions	3	05/10/2022	07/10/2022	Daniel
Terminologies	1	07/10/2022	07/10/2022	Gauri
Stakeholders	1	05/10/2022	05/10/2022	Gauri
Roles	1	17/10/2022	17/10/2022	Daniel
Belbin Types	1	18/10/2022	18/10/2022	Aamir
Requirements	**14**	**07/10/2022**	**20/10/2022**	**All**
Functional Requirements	7	07/10/2022	13/10/2022	Sanjeevani, Praveen, Rylan, Ismael,Gauri
Non-Functional Requirements	14	07/10/2022	20/10/2022	Daniel, Gauri, Tejas, Aamir, Rylan
UML	**28**	**21/10/2022**	**17/11/2022**	**Daniel, Gauri, Sanjeevani**
Use case diagram	2	21/10/2022	22/10/2022	Daniel, Gauri, Sanjeevani
Textual description Use Cases	18	24/10/2022	10/11/2022	Daniel, Gauri, Sanjeevani
Traceability Matrix	1	17/11/2022	17/11/2022	Sanjeevani
Sequence diagram	2	14/11/2022	15/11/2022	Gauri, Sanjeevani
Activity diagram	1	16/11/2022	16/11/2022	Gauri, Sanjeevani
State Machine diagram	1	17/11/2022	17/11/2022	Gauri, Sanjeevani
Risk Management	**22**	**18/10/2022**	**08/11/2022**	**Tejas, Ismael, Praveen, Aamir**
Risk Approach	3	18/10/2022	20/10/2022	Tejas
Risk Identification	7	21/10/2022	27/10/2022	Ismael, Praveen, Tejas

Risk Analysis	11	23/10/2022	02/11/2022	Ismael, Praveen, Tejas, Aamir
Risk Planning	15	24/10/2022	07/11/2022	Ismael, Praveen, Tejas, Aamir
Risk Monitoring	6	03/11/2022	08/11/2022	Ismael, Praveen, Tejas
Project Decisions and Planning	**7**	**15/11/2022**	**21/11/2022**	**Aamir, Gauri, Ismael**
Software	1	18/11/2022	18/11/2022	Ismael
Software Process	1	15/11/2022	15/11/2022	Gauri
Sub System Division	3	19/11/2022	21/11/2022	Aamir
Product Assessment	2	19/11/2022	20/11/2022	Ismael
Contributions	2	18/11/2022	19/11/2022	Ismael
Development Methodology	1	15/11/2022	15/11/2022	Gauri
Gantt Chart	3	18/11/2022	20/11/2022	Gauri
Project Costing	**10**	**09/11/2022**	**18/11/2022**	**Daniel**
Cost Breakdown Structure	2	09/11/2022	10/11/2022	Daniel
Cost Descriptions	2	11/11/2022	12/11/2022	Daniel
Cost Table	3	13/11/2022	15/11/2022	Daniel
Cost Overheads	3	16/11/2022	18/11/2022	Daniel
Usability Evaluation of Mock-ups	**14**	**09/11/2022**	**22/11/2022**	**Aamir, Ismael, Praveen, Rylan, Sanjeevani, Tejas, Daniel**
Gathering information for prototypes	2	15/11/2022	16/11/2022	Aamir, Ismael
Creating Prototype	5	16/11/2022	20/11/2022	Aamir, Ismael, Rylan, Sanjeevani
Testing Prototype	2	20/11/2022	21/11/2022	Aamir, Ismael, Rylan
Usability Testing Plan	2	20/11/2022	21/11/2022	Praveen, Tejas
Ethics form	2	09/11/2022	10/11/2022	Praveen
Questionnaires (Pre and Post)	2	18/11/2022	19/11/2022	Praveen, Tejas, Daniel

Testing Protocol	4	11/11/2022	14/11/2022	Praveen, Daniel
Data Findings	2	20/11/2022	21/11/2022	Praveen, Tejas, Ismael
Conclusion	3	20/11/2022	22/11/2022	Tejas, Ismael, Daniel, Praveen
Submission of Stage 1 documentation	**1**	**24/11/2022**	**24/11/2022**	All

STAGE 2

Topic	No. of Days	Start Date	End Date	Contributors
Stage 2	**100**	**14/12/2022**	**23/03/2022**	**All**
SPRINT 1	**3**	**14/12/2022**	**16/12/2022**	
Database modelling/initialization	1	14/12/2022	14/12/2022	
Database designing	2	14/12/2022	15/12/2022	
Testing and documentation	2	15/12/2022	16/12/2022	
SPRINT 2	**6**	**17/12/2022**	**22/12/2022**	
Login page	2	17/12/2022	18/12/2022	
Registration	2	17/12/2022	18/12/2022	
Modifying user profile	2	19/12/2022	20/12/2022	
Testing and documentation	2	21/12/2022	22/12/2022	
SPRINT 3	**8**	**23/12/2022**	**30/12/2022**	
Creating a memory	2	23/12/2022	24/12/2022	
Editing a memory	2	25/12/2022	26/12/2022	
Creating a Scrapbook	2	27/12/2022	28/12/2022	
Testing and documentation	2	29/12/2022	30/12/2022	

SPRINT 4	**8**	**02/01/2023**	**09/01/2023**	
Geotagging a Memory	3	02/01/2022	04/01/2023	
Geotagging a Scrapbook	3	02/01/2022	04/01/2023	
Adding a memory in a scrapbook	3	05/01/2023	07/01/2023	
Testing and documentation	2	08/01/2023	09/01/2023	
SPRINT 5	**7**	**10/01/2023**	**16/01/2023**	
Liking and commenting	3	10/01/2023	12/01/2023	
Personal Chats	3	13/01/2023	15/01/2023	
Testing and documentation	2	15/01/2023	16/01/2023	
SPRINT 6	**8**	**17/01/2023**	**24/01/2023**	
Creating a Group	3	17/01/2023	19/01/2023	
Joining a Group	3	18/01/2023	20/01/2023	
Modifying a Group	2	21/01/2023	22/01/2023	
Testing and documentation	2	23/01/2023	24/01/2023	
SPRINT 7	**9**	**25/01/2023**	**02/02/2023**	
Implementing the Map for shared media	2	25/01/2023	26/01/2023	
GPS waypoint to scrapbook	2	27/01/2023	28/01/2023	
Annotation overlays on Map	2	29/01/2023	30/01/2023	
Testing and documentation	2	31/01/2023	01/02/2023	
Submission of Stage 2 documentation	**1**	**02/02/2023**	**02/02/2023**	
SPRINT 8	**7**	**03/02/2023**	**09/02/2023**	

Implementing additional features specific to certain categories	5	03/02/2023	07/02/2023	
Testing and documentation	2	08/02/2023	09/02/2023	
SPRINT 9	**6**	**10/02/2023**	**15/02/2023**	
Content moderation	4	10/01/2023	13/01/2023	
Testing and documentation	2	14/01/2023	15/02/2023	
SPRINT 10	**20**	**16/02/2023**	**07/03/2023**	
Website making	18	16/02/2023	05/03/2023	
Testing and documentation	2	06/03/2023	07/03/2023	
SPRINT 11	**23**	**08/03/2023**	**23/03/2023**	
Bug Fixes	6	08/03/2023	13/03/2023	
Testing the application	5	14/03/2023	18/03/2023	
Testing the website	5	14/03/2023	18/03/2023	
Documentation	3	19/03/2023	21/03/2023	
Demonstration to Manager	**1**	**23/03/2023**	**23/03/2023**	

STAGE 3

Topic	No. of Days	Start Date	End Date	Contributors
Stage 3	**36**	**22/02/2023**	**30/03/2023**	**All**
SPRINT 12	**12**	**22/02/2023**	**05/03/2023**	
Marketing Analysis and Strategy for product	8	22/02/2023	03/03/2023	
Testing and documentation	2	04/03/2023	05/03/2023	
SPRINT 13	**19**	**07/03/2023**	**25/03/2023**	
Bug fixes	6	07/03/2023	12/03/2023	

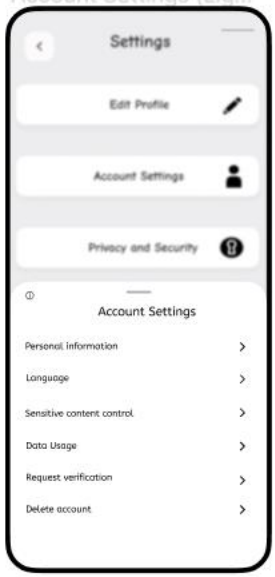
Testing	5	13/03/2023	17/03/2023	
Final finished documentation	4	18/03/2023	21/03/2023	
Project review	3	23/03/2023	25/03/2023	
SPRINT 14	**5**	**26/03/2023**	**30/03/2023**	
Final testing/evaluation	3	26/03/2023	28/03/2023	
EXPO	1	30/03/2023	30/03/2023	

8.4. COSTING REFERENCES

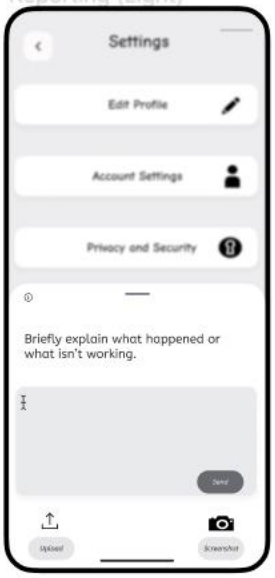
- *References for the costs found in section 6*
  1. *Certified ScrumMaster (CSM) Hourly Rate in United Arab Emirates | PayScale*
  2. *Hourly wage for Lead Software Engineer | Salary.com*
  3. *https://www.payscale.com/research/AE/Job=Front_End_Developer_%2F_Engineer/Salary*
  4. *Software Engineer / Developer / Programmer Salary in United Arab Emirates | PayScale*
  5. *https://www.payscale.com/research/AE/Job=Database_Administrator_(DBA)/Salary*
  6. *https://www.payscale.com/research/AE/Job=Software_Tester/Salary*
  7. *https://www.rta.ae/wps/portal/rta/ae/public-transport/Nol-Fares*
  8. *https://livlyt.com/product/apple-iphone-13*
  9. *https://livlyt.com/product/samsung-galaxy-s21*
  10. *https://livlyt.com/product/apple-imac-m1-24-inch*
  11. *Hostinger*
  12. *https://firebase.google.com/pricing#blaze-calculator*
  13. *Google Developer Fee*.
  14. *Apple Developer Fee*.
  15. *APIS to be used unknown, 100 kept as worst-case backup*

8.5. MOCK-UP DESIGNS

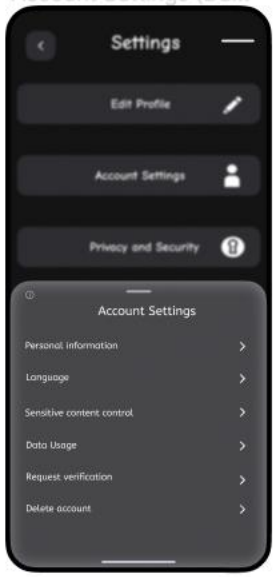
Account Settings (Lig...



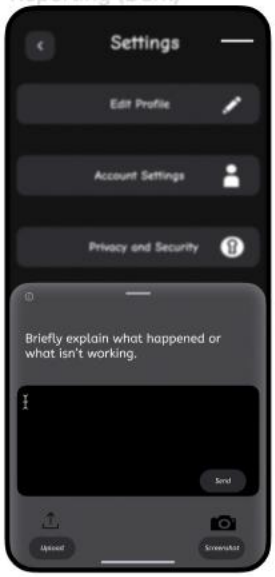
Reporting (Light)

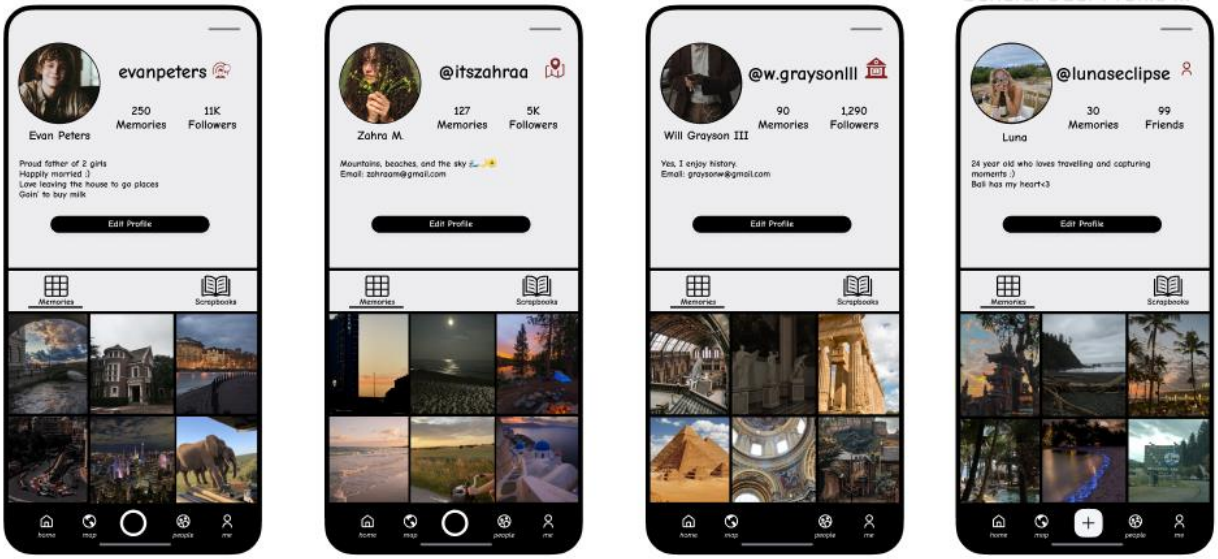


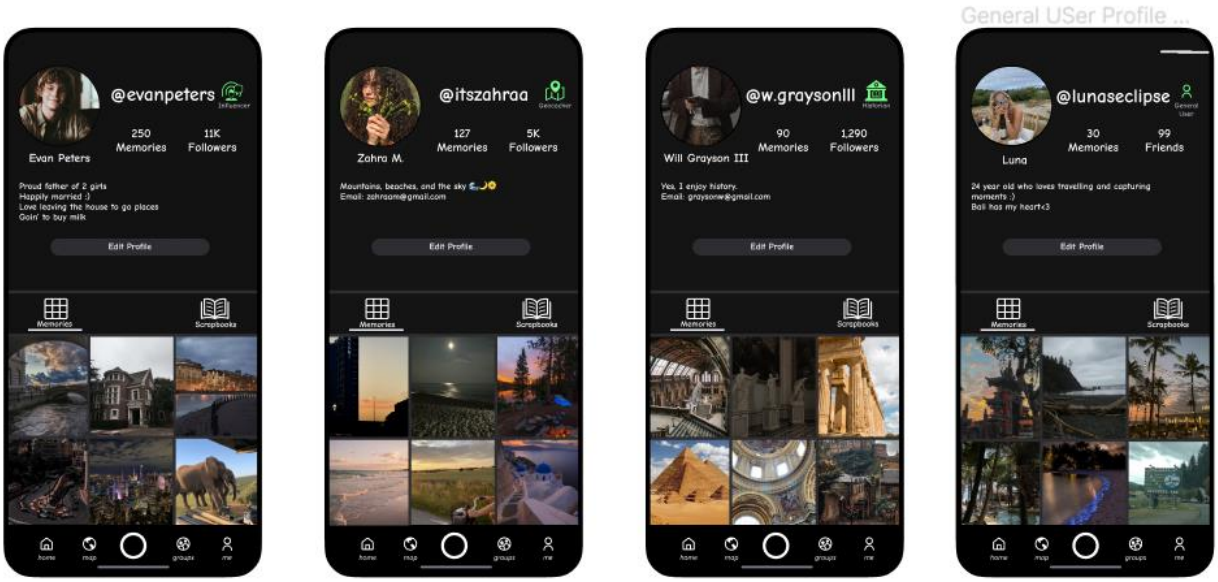
Account Settings (Da...



Reporting (Dark)




General USer Profile ...
evanpeters
250 Memories
11K Followers
Evan Peters
Proud father of 2 girls
Happily married :)
Love leaving the house to go places
Goin' to buy milk
Edit Profile
Memories
Scrapbooks
@itszahraa
127 Memories
5K Followers
Zahra M.
Mountains, beaches, and the sky
Email: zahraam@gmail.com
Edit Profile
@w.graysonIII
90 Memories
1,290 Followers
Will Grayson III
Yes, I enjoy history.
Email: graysonw@gmail.com
Edit Profile
@lunaseclipse
30 Memories
99 Friends
Luna
24 year old who loves travelling and capturing moments :)
Bali has my heart<3
Edit Profile


General USer Profile ...
@evanpeters
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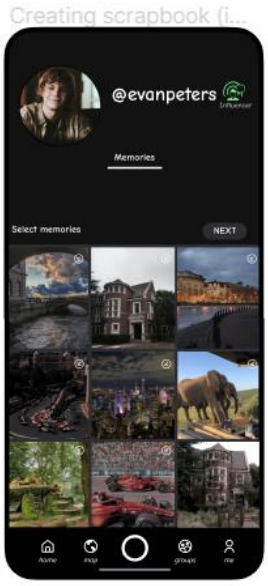
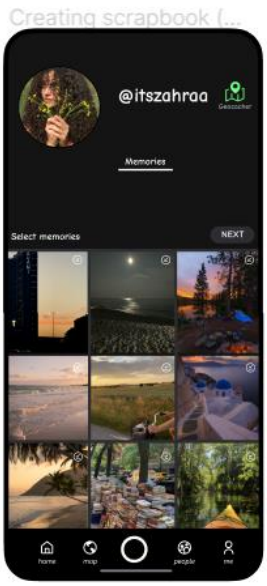
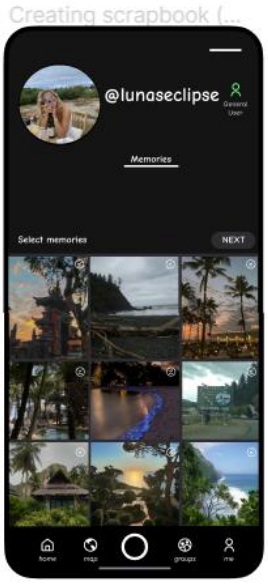
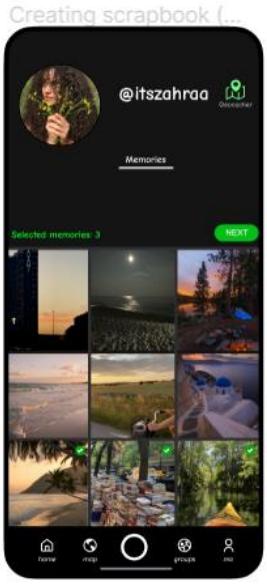

Creating scrapbook (i...
@evanpeters
Memories
Select memories
NEXT


Creating scrapbook (...
@itszahraa
Memories
Select memories
NEXT


Creating scrapbook (...
@w.graysonIII
Memories
Select memories
NEXT


Creating scrapbook (...
@lunaseclipse
Memories
Select memories
NEXT


Creating scrapbook (i...
@evanpeters
Memories
Selected memories: 3
NEXT

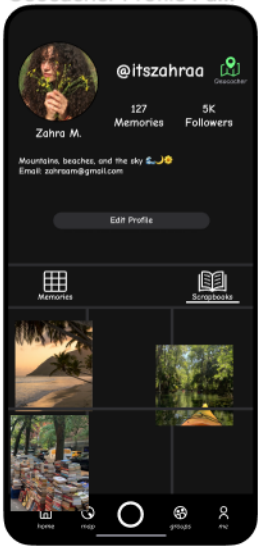

Creating scrapbook (...
@itszahraa
Memories
Selected memories: 3
NEXT


Creating scrapbook (...
@w.graysonIII
Memories
Selected memories: 3
NEXT

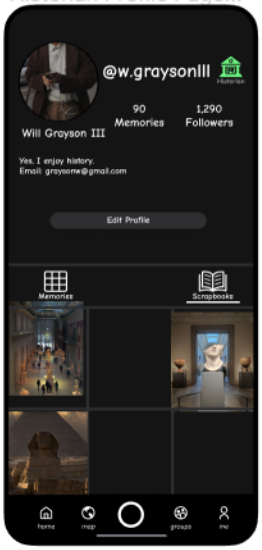

Creating scrapbook (...
@lunaseclipse
Memories
Selected memories: 3
NEXT

Influencer Profile Pag...

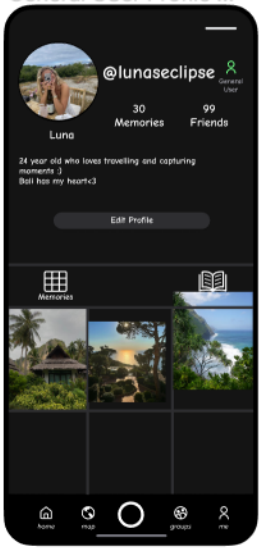
Geocacher Profile Pa...



Historian Profile Page...

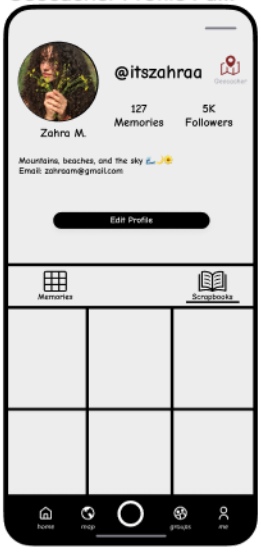


General USer Profile ...



Influencer Profile Pag...

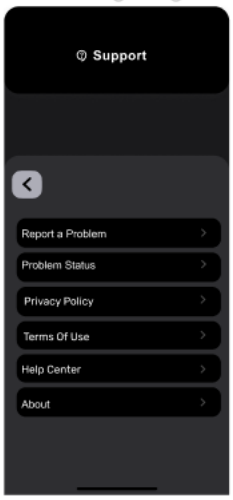
Geocacher Profile Pa...



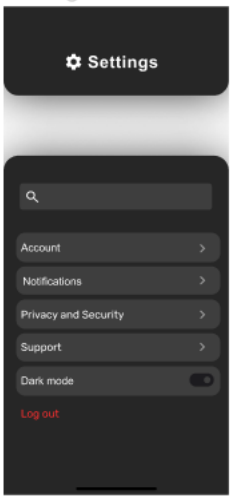
Historian Profile Page...

Historian Profile Page...

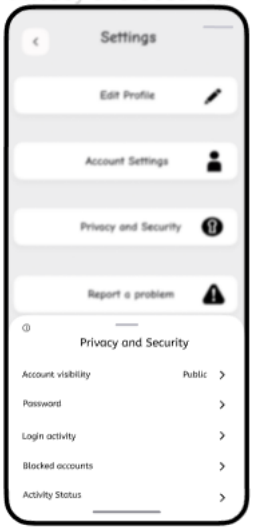
3.4. Settings Page...



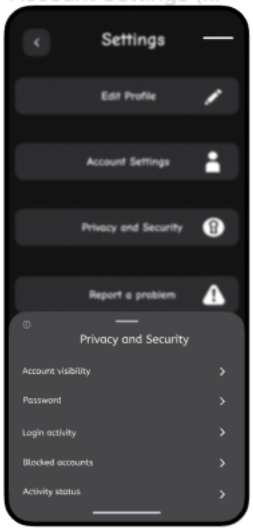
Settings Dark Mode



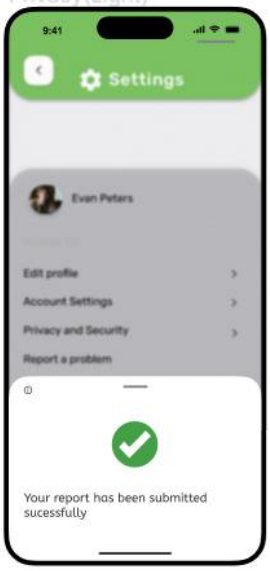
Privacy and Securit...



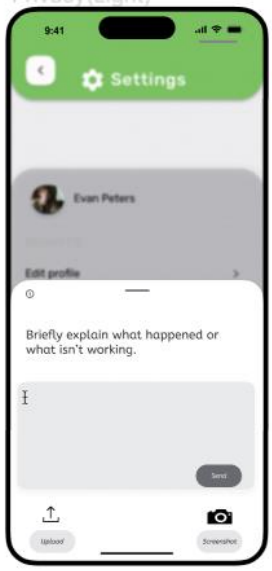
Account Settings (...



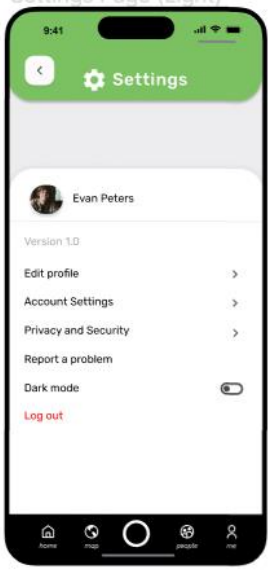
Privacy(Light)



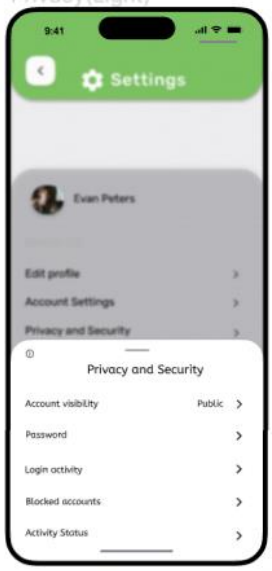
Privacy(Light)



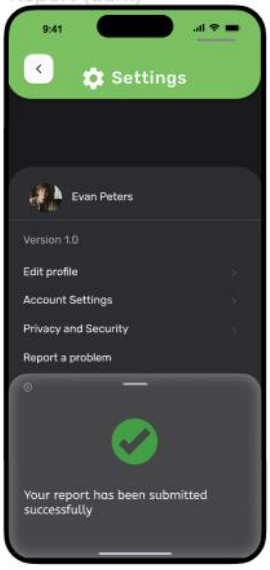
Settings Page (Light)



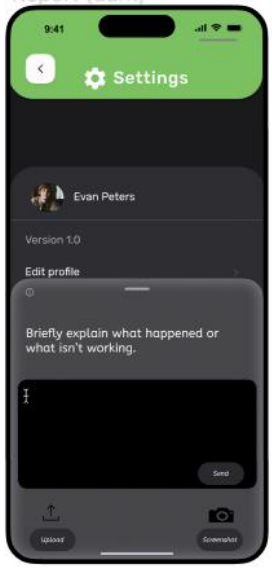
Privacy(Light)



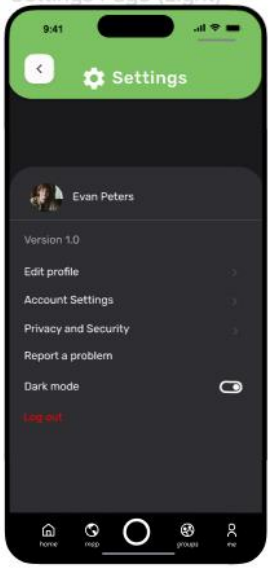
Report (dark)



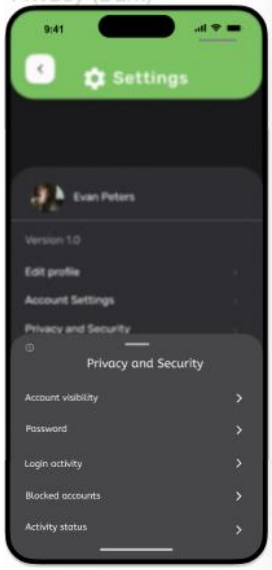
Report (dark)

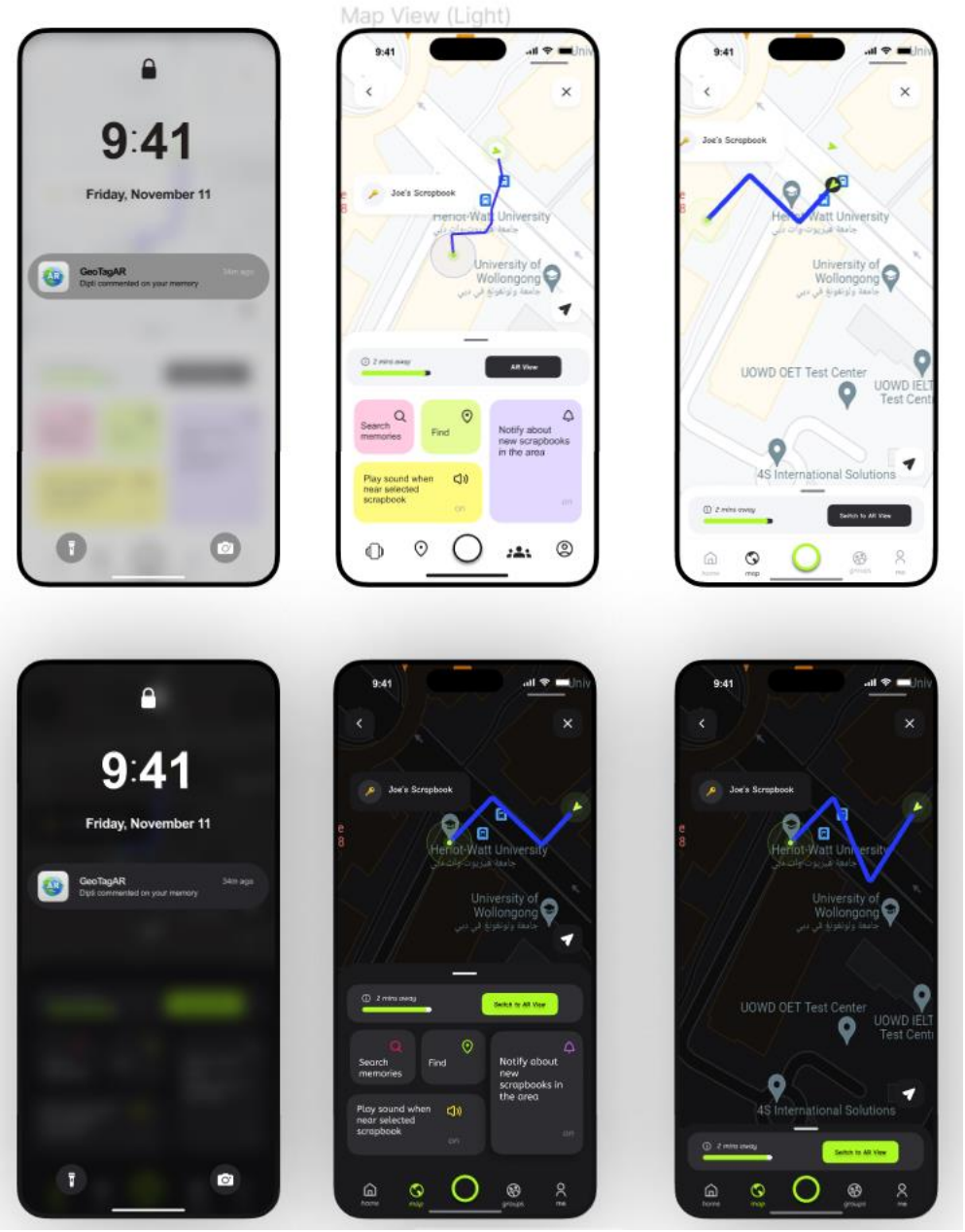


Settings Page (Light)



Privacy (Dark)




Map View (Light)
9:41
Friday, November 11
GeoTagAR
Dipti commented on your memory
Joe's Scrapbook
Heriot-Watt University
University of Wollongong
Search memories
Find
Notify about new scrapbooks in the area
Play sound when near selected scrapbook
UOWD OET Test Center
4S International Solutions

8.6. ETHICS FORM

Students:	Aamir Nazir, Gauri D Revankar, Ismael Shaikh, Jacinth Daniel Moses, Praveen Venkataraman, Rylan Chris Silveira, Sanjeevani Rajpurohit, Tejas Syam
Title:	*GeoTagAR*
Supervisors:	Abrar Ullah

1. Abstract:

GeoTagAR is a social media application, providing users with a way to connect and share AR-based content. The system will function as a ***scrapbooking*** platform, allowing users to capture moments in image, audio, or video format. These moments will also be tagged with its location when shared. Additionally, users can select specific categories to be part of, i.e., geocachers and historians. Each category provides users with extra features developed specifically for that category.

2. ***Purpose of Study:***
   The purpose of the study is to test mockups and prototypes on human subjects and get their opinions and feedback about the mockup's design. This will be done through the usage of questionnaires.
3. ***Does the research involve human subjects?***
   YES
4. ***Will personal data be collected? (Personal data is information that relates to an identified or identifiable individual, e.g. name, address, IP address or a cookie identifier…..)***
   NO
   4.1. Will the information be anonymized and unlinked?
   N/A
   4.2. Will it be anonymized and linked?
   N/A
5. ***Will the research participants be identifiable?***
   NO

Use of Human Participants

1. *Please outline the nature of the research involving human participants. Please detail why the research aims cannot be met with existing data.*
   Our objective is to test out the user friendliness of this application – this cannot be done without human subjects, as user friendliness is subjective, and cannot be statisticized.

2. ***Are all participants to be recruited over 16, able to give informed consent, and have no known impediment that might affect their ability to participate in the study? (Y/N)***
   Yes

3. ***How long will participants have to decide whether to take part in the study?***
   1 Week
4. ***Does the study involve actively deceiving participants?***
   No

5. ***Will participants be using non-standard hardware, e.g., eye-trackers, development prototypes? (Y/N)***
   No

Data Protection Compliance

1. ***I confirm that:***
   - *All data will be stored on a HWU server*
   - *No identifiable personal information will be presented in public or in any report*

- *Linked anonymised data will be linked so that the identifying codes will be kept in a secure locked cabinet or in a password protected file*
- *Linked anonymised data will only be retained for the duration of the consent granted by the participant and will be destroyed after February 2022*
- *External data and systems will be used within the licence terms specified*

In accordance with GDPR regulation.
Yes

Health and Safety Risk Assessment

1. ***I confirm that the project involves only standard IT equipment and exposes participants to no more hazards than a conventional office environment.***
   Yes

Declarations

Group

I confirm that the above information is accurate and a true reflection of the intended study.
Name: Group 11
Date: 24/11/2022

Supervisor

I, as supervisor of the above student group, have checked the above for accuracy and I am satisfied that the information provided is a true reflection of the intended study.
Name:
Date:

8.7. CONSENT FORM

- *Terminology for section 7*

Heriot-Watt University

Consent to Act as a Subject in The GeoTagAR Usability Study

Principal Investigators:

AAMIR NAZIR	*MN2025@HW.AC.UK*	*PRAVEEN VENKATARAMAN*	*PV2003@HW.AC.UK*
GAURI D REVANKAR	*DR2007@HW.AC.UK*	*TEJAS SYAM*	*TS2011@HW.AC.UK*
ISMAEL SHAIKH	*MS2019@HW.AC.UK*	*SANJEEVANI RAJPUROHIT*	*SR2033@HW.AC.UK*
JACINTH DANIEL MOSES	*JDM2003@HW.AC.UK*	*RYLAN CHRIS SILVEIRA*	*RCS4@HW.AC.UK*

Description: The purpose of this study is to evaluate the product usability in the hands of the target demographic which has no connection to product development. There are minimal risks for you as a user if you decide to participate in this study. All personal information provided by you will be kept confidential in a secure filing cabinet or password-protected computer directories.

Your participation or willingness to no longer participate at any given time will not affect your performance in your registered courses (if you are a student) or your relationship with the university in any way. You are free to decline participation in this study.

Voluntary consent: I certify that I have read the preceding and that I understand its contents. Any questions I have pertaining to the research have been and will be answered by the team. My signature below means that I have freely agreed to participate in this study, and that I agree to the publication of the results for scientific purposes and to the distribution of the recordings and transcripts of the sessions for research purposes so long as my identity is not revealed.

_____ _____ _____

Date Subject Signature Inv. Initials

Investigator's certification: I certify that I have explained to the above individual the nature and purpose, the potential benefits, and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature.

_____ _____

Date Investigator Signature

8.8. INITIAL QUESTIONNAIRE

1. *What is your age?* *
   - *18 – 24*
   - *25 – 34*
   - *35 – 50*
   - *51 - 65*

2. *What is your gender?* *
   - *Male*
   - *Female*
   - *Other*
   - *Prefer not to say*

3. *How often do you use social media?* *
    - *Daily*
    - *Weekly*
    - *Monthly*
    - *Never*

4. *Have you heard of the term "Augmented reality"?* *
    - *Yes*
    - *No*

8.9. EXIT QUESTIONNAIRE

1. *What feature did you like **most** about the prototype?* *

2. *What feature did you like **least** about the prototype?* *

3. *Rate your overall experience with the prototype:* *

	Strongly Disagree	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
Application was easy to use					
The icons aptly represented the purpose of the features					
User interface was visually appealing					
Buttons were located in a logically organized and convenient manner					

Some features of the application were unclear					

4. *How would you rate your overall experience with the system?* *

<-- Very Poor *Excellent -->*

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*

5. *Do you have any additional comments?*