Winfra

System Requirements Specification (SRS)

Version 4.0

Document Number: SRS-004

Project Team Number: B13

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REVIEW AND APPROVALS

Team Members	Function	Date	Signature
Jenesis Blancaflor	Project Manager	2/10/25	JB
Sanjida Orpi	Project Manager	2/10/25	SO
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REVISION LEVEL

Date	Revision Number	Purpose
9/24/2024	Version 1.0	Initial Release
10/1/2024	Version 1.1	Revised Release
10/15/2024	Version 2.0	Requirements Release
11/7/2024	Version 3.0	Analysis Release
2/10/2025	Version 4.0	Revised Re-release

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1. DOCUMENT PURPOSE

1.1. PURPOSE

The purpose of this document is to specify the system requirements and analysis of the proposed infrastructure improvement application, Winfra. This document aims to ensure that all parties have a clear understanding of the project scope, objectives, and requirements, alignment on quality standards, development milestones and business needs.

2. INTRODUCTION

There is a critical need for centralized resources to address infrastructure challenges in New York City. A lack of accessible and maintained infrastructure significantly amplifies the barriers faced by people with disabilities and obstructs people from accessing public services and transportation. The Winfra system intends to improve New Yorkers' satisfaction with infrastructure and initiate infrastructural development to enhance the quality of living in NYC. The web-based system aims to build an interactive network for citizens to report damaged or ineffective infrastructure, which will facilitate development and improvement where it is urgently needed.

2.1. SCOPE

The system will include the following functions:

- Infrastructural suggestion
- Community connection
- Accessibility promotion
- Interactive map interface
- Location authentication
- CTA

The platform will allow users to post reports of issues in real time through a simple location pin-drop feature on an interactive map interface. Each post will provide a detailed report of an issue along with the citizen's recommendations and exigencies for improvement.

Users will be able to view reported problems within their area and engage in discussions to build community awareness. The system will enable direct outreach to local government representatives, which will streamline efforts to address infrastructure needs in underrepresented areas.

The system will be implemented as a web application to be supported on desktop and mobile environments, to support time sensitive reports regarding

infrastructure. The system will centralize infrastructural reports onto a single, accessible platform that enables users to track issues in their communities.

2.2. IDENTIFICATION

Winfra System Requirements Specification SRS-004 Version 4.0

2.3. BOUNDS

Internal Bounds:

The system requires a procedure for user authentication and data storage to handle potentially tens of thousands individual user data. Additional bounds for the application are the provision of infrastructural support for users such as data categorization and resource allocation. The platform will be constrained by performance requirements, ensuring that it operates efficiently even under high traffic. We also hope to have an interactive map interface for users as well as to help direct users to more accessible portions of the city.

System boundaries: (external factors)

Users must be able to send data requests to help the application consider potential cases to direct resources to solve. We will use open-source map data and city data to provide us with map and geolocation features. Finally, we also hope to incorporate external APIs to help manage our user authentication and finances. Any integration with third-party map services will be limited to APIs that support location logging; it will not manage external map data beyond user interactions.

2.4. OBJECTIVES

The high-priority tasks for the project include users being able to report and view infrastructural suggestions through an interactive map as well as access real-time accessibility information. Low-priority tasks for the project include an integrated advertisement system as well as CTA prompts for users to address their infrastructural problems through contacting local representatives or contractors in the area.

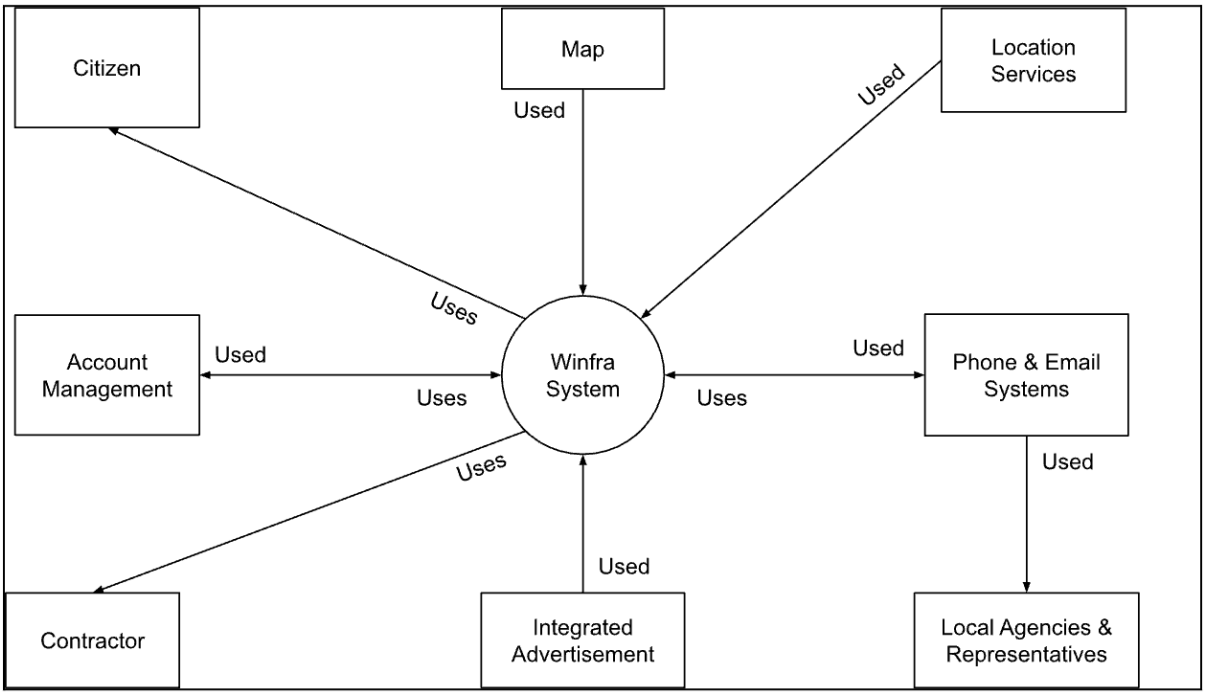
The project will be delivered as a web application that will be accessible through desktop and mobile devices. We plan to distribute the application incrementally with the stakeholders to involve them in the process and ensure that all requirements are being met throughout the project. Our first steps would be to complete the aforementioned high-priority tasks. Once those tasks are completed, modified if necessary, and approved by the stakeholders, we will continue to work on the low-priority tasks. The same process of completion, modification if necessary and approval will be conducted with low-priority tasks. Once all of the functional components of the project are completed, the quality assurance team can take over and ensure that the application is functional and consistent.

Initial Deliverable Dates:

- Project Proposal: February 5, 2025
- Software Requirements Specification (SRS): February 10, 2025
- Software Project Management Plan (SPMP): February 19, 2025
- Project Description: February 24, 2025
- Design Description (SDD) – Initial (w/ initial code): March 3, 2025
- Design Document Final (w/ final code): April 21, 2025 – May 5, 2025

- Formal Oral Presentation / Demonstration: April 21, 2025

2.5. CONTEXT DIAGRAM



In the context diagram above, usage relationships between components of the *Winfra* system are shown. A component that is *used* has objectives whose completion does not depend on the system (e.g. displaying advertisements, reporting location), and a component that *uses* has objectives whose completion is affected by the system (e.g. data management or infrastructural development).

2.6. ADDITIONAL DESCRIPTIVE ITEMS

None at this time

3. GLOSSARY

Term	Definition
CTA	Call to Action
Scalable software	Development languages that are popular or easy to use.
SQL	Structured Query Language: Used for database management
API	Application Programming Interface
UI	User Interface
Front-end Technologies	Tools and frameworks used to build the user interface the web applications
Back-end Technologies	Tools and frameworks used to build the service side portion of the user interface the web applications
Geolocation	The mapping of an IP address, used to identify the geographic location of a device
Target location	The location at which a user aims to review local infrastructure
PK	Primary Key
FK	Foreign Key

4. REFERENCE DOCUMENTS

Winfra Project Proposal Version 1.0 February 3, 2025

5. BUSINESS REQUIREMENTS

5.1. TECHNOLOGY

The breakdown of our business needs requires the team to develop a website, therefore we will incorporate an interactive map API to support location-based logging of infrastructure issues, allowing users to pin their location and visualize problems geographically. Users will also be able to report cases of inaccessibility in their area requiring the implementation of a community forum. Users will be able to quickly access their local representatives' contact information for issues concerning public infrastructure. Users will also be able to contact local contractors for issues concerning private infrastructure. These interactions will require location-based services, communication tools, and data management within the application. Additionally, the development team must decide on the best languages to construct the front-end and back-end of the application. We also require the implementation of scalable software. We need to maintain a database of users and their activity; this can be accomplished using postgreSQL. We also require an application testing interface, for our application we can use Selenium WebDriver.

5.2. ECONOMICS

As our website gains traction among users, ads and purchasing opportunities may be developed. Therefore, the business needs for our market economics require us to have large scale distribution among concentrated groups in cities and states. Our business finances are managed by professional teams as well as angel investors and venture capitalists who have helped finance our application development.

5.3. REGULATORY AND LEGAL

We have placed our regulatory and legal services with a notable law firm that has interests in civil and corporate law. Our lawyers help us direct our civic-focused technology services to ensure the development process is legal.

5.4. MARKET CONSIDERATIONS

Our application and business needs are centered around civic-engagement and daily use cases that provide people the opportunity to use our application. In order to have an active user base, we hope to petition with government officials to help promote the use of this application and potentially engage students around the New York City Metropolitan area.

5.5. RISKS AND ALTERNATIVES

The potential risks of the project are summarized in the following risk table:

Risk	Description	Probability	Impact	Mitigation / Alternative Solution
Size estimate may be significantly low	PS	50%	2	Define scope at onset of project and check the relevance of updated requirements
Larger number of users than expected	PS	20%	3	Prioritize scalability for all components
Less reuse than expected	PS	60%	3	Identify patterns in design and modeling phases
End users resist system	BU	25%	2	Maintain communication with users through development and deployment
Technology will not meet expectations	TR	10%	1	Use functional APIs as much as possible; keep functional requirements as simple as possible
Staff inexperienced	ST	40%	3	Hold skills training sessions while keeping implementations simple
Categories: Project size (PS), business risk (BU), technology risk (TR), staff				

(risk) ST.
Impact values: 1 – catastrophic, 2 – critical, 3 – marginal, 4 – negligible.

5.6. HUMAN RESOURCES AND TRAINING

We hope to hire an external human resources team in order to keep our company lean, however, we will provide all our employees with simple HR training modules such as team-work expectations and guidelines to be successful in the workplace.

6. USER REQUIREMENTS (DESCRIPTIVE FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS)

6.1. FUNCTIONAL DESCRIPTIVE DETAILED REQUIREMENTS

1. **Infrastructural Suggestion:** The user logs into *Winfra* and selects the “post” button from the major function buttons. The system displays a text editor where the user can create a post detailing the infrastructural problem, with choice to include a description, severity, and images. including problem, severity, and images. Then the user selects the “submit” button. This requirement allows users to report infrastructure issues in their area as well as see other issues reported in

their geographical community. The location of the reports is recorded and shared with the surrounding community for other users to see and be aware of.

2. **Community Building:** The user will be able to interact with their geographical community by communicating with them via forums on the platform. Users can interact with one another by commenting on infrastructure issue reports to ask questions, provide updates and give feedback on the corresponding issue. A user who is logged into *Winfra* can navigate to their target location and select an existing post. The user can read the suggestion contained in the selected post and has the option to select the “Reply” button under the post or an existing reply under the post. The system will then display a text editor. The user can write and customize a new reply post and click on the “submit” button when they are done writing. The reply post will be visible to all Winfra users.

3. **Interactive Map:** An interactive map will allow users to see if there are any infrastructure issues in their surrounding areas with a dynamic map that shows real-time problems. It will display problems using icons or markers, with different colors or symbols indicating the type and severity of the issue. The map will also feature filters to help users sort by issue type, severity, or location. This tool will keep the map updated with live data and provide an intuitive way for users to engage with local infrastructure concerns. A logged-in user can navigate

to a target location and select the “Rate” button from the major function buttons. The system will present options for infrastructure and accessibility, if the “Infrastructure” button is clicked, the system will present a textual review of the target location based on *Winfra* posts made in the selected bounds. An accompanying figure will represent the averaged severities across relevant posts made within the target location.

4. **Promotion of Accessibility:** The website will provide users with detailed accessibility information, indicating areas that may be inaccessible and specifying the reasons, such as construction, damage, or lack of necessary infrastructure. This feature will assist users, especially those with disabilities, in navigating their surroundings more effectively by highlighting accessible routes or locations that require caution or avoidance. A logged-in user will have the ability to navigate to the target location where they can select the “Rate” button from the major function buttons. The system will present options for infrastructure and accessibility and the user can select the “Accessibility” button. The system will then present a textual review about accessibility in the target location based on *Winfra* posts made in the selected bounds.

5. **Real-Time Updates:** Users will have the ability to both post and receive real-time updates about infrastructure issues in their area. This feature ensures that the

platform stays current, allowing users to report new problems or track ongoing repairs as they happen. Notifications can be sent when issues are resolved or when new developments occur, keeping the community informed at all times. The *Winfra* system receives notice of an update to an infrastructural feature with outstanding suggestions and notifies all users that have posted or replied to suggestions that updates have been made. The user can select the pop-up notification that they will receive if notifications are enabled, when clicked, the system will display the update made to the infrastructural suggestion post that the user interacted with.

6. **Contacting Local Representatives:** Through geographical information, users will be connected with information about their local representatives who are able to assist with fixing and updating local public infrastructure. This feature facilitates direct communication between citizens and government officials, enabling users to report issues or follow up on the status of infrastructure repairs, encouraging accountability and faster resolutions. When a user has logged into *Winfra* and submitted a new post, the system will display the CTA modal with options to contact a local representative. The user can select the “Call” button to be redirected to their phone client. The user can then make a call to their local representative and the Winfra application will be exited.

6.2. NON-FUNCTIONAL DESCRIPTIVE DETAILED REQUIREMENTS

The non-functional requirements of the *Winfra* project are security, performance, usability, and maintainability. Security has a conflicting relationship with performance and usability, and has a complementary relationship with maintainability. Performance has a complementary relationship with usability and an overlapping relationship with maintainability. Usability has a complementary relationship with maintainability. We chose these non-functional requirements based on these relationships and our priority to ensure that our system is secure, user-friendly, easy to maintain, and meets high performance.

1. **Security:** The security attribute measures the system's protection of user data and its capacity to protect sensitive information against unauthorized users or adversarial attacks. Each user's profile information should be secure and protected such that they are the only person able to access this data. When a logged-in user selects their profile, they will be able to view the data associated with their account, such as name, username, and location information. On the system's end, this data will only be made available to the user which it belongs to and no other users.
2. **Performance:** The performance attribute measures the speed of the system's outputs. Of particular interest are the visibility of the map

interface, the visibility of users' new suggestions, visibility of existing suggestions submitted by other users, accuracy of location-based services, latency of real-time updates and notifications, and the community forum. Scalability is also necessary for satisfactory performance; the growth of the user base of the *Winfra* system should not impede its performance.

3. **Usability:** Usability is a quality attribute that measures the ease of use of the system and users' ability to understand and interact with the features of the system. The map interface should have a clear and familiar design that is easily comprehensible; usability will be reflected in users' fluency with creating and posting new suggestions, contacting local representatives, viewing existing suggestions, and reviewing the infrastructure and/or accessibility of their target locations. It is also in the interest of usability to avoid clutter in interface design. Layouts should show critical information and actions.
4. **Maintainability:** Maintainability is a quality attribute which measures the system's ability to adapt and improve as system requirements change. Maintainability assesses the speed of fixing an issue in the system and the effectiveness of the update, which should be compatible with the existing system. Changes made to any feature should be fixed efficiently and remain compatible with the rest of the system such that users still understand and expect how to use the features of the system. The practice

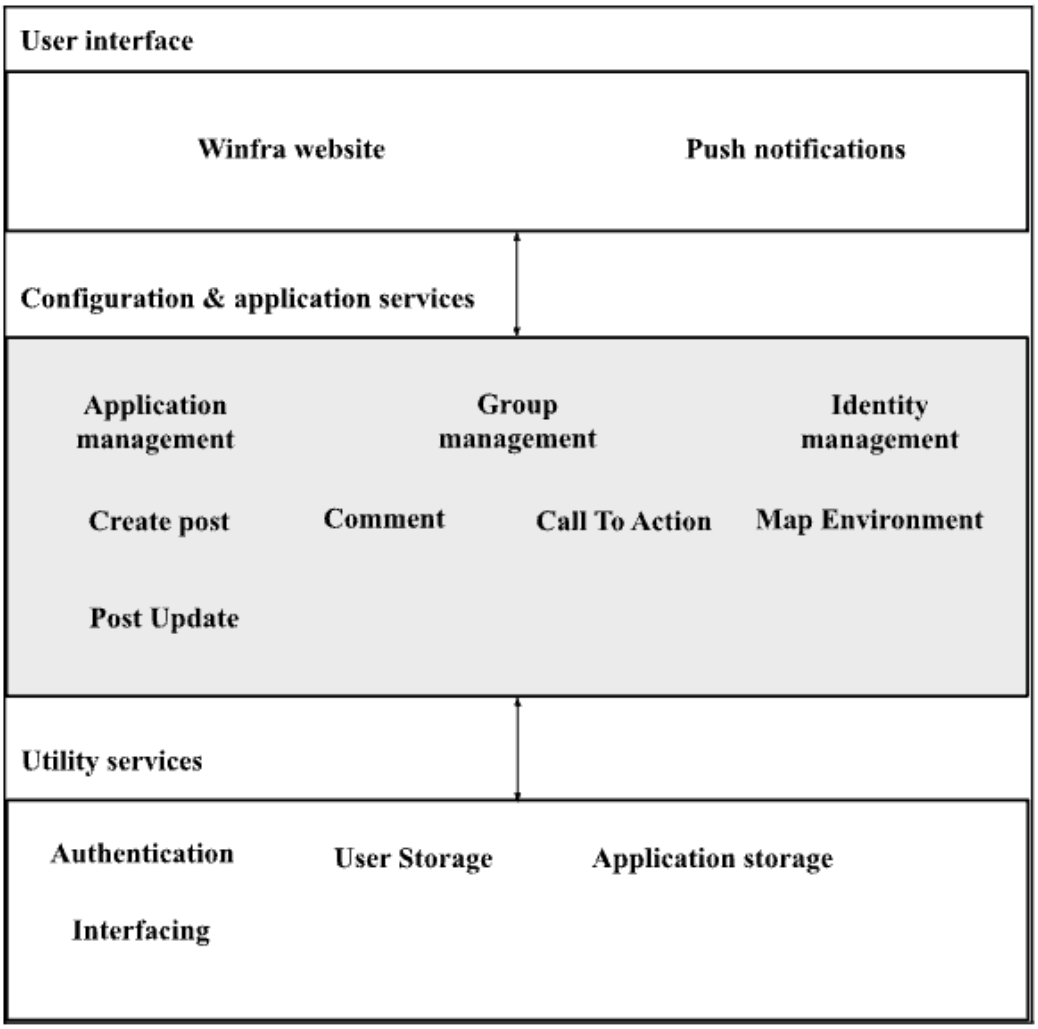
of modularity contributes to maintainability in that issues contained within modules will not necessarily cause greater problems in the global context of the system.

7. SYSTEM ARCHITECTURE

The layers of the system architecture include the User Interface, Application Layer, and the Database:

1. The User Interface layer handles the interaction between the end user, where it provides the user with a graphical user interface to enhance submitting infrastructure issues, viewing suggestions, and interacting with the map.
2. The Application Layer processes requests from the user interface and interacts with the database layer as needed.
3. The Database helps store and retrieve user information, user posts, relationships between components, and external data needed to operate the application.

These three layers are depicted in the architecture diagram below.

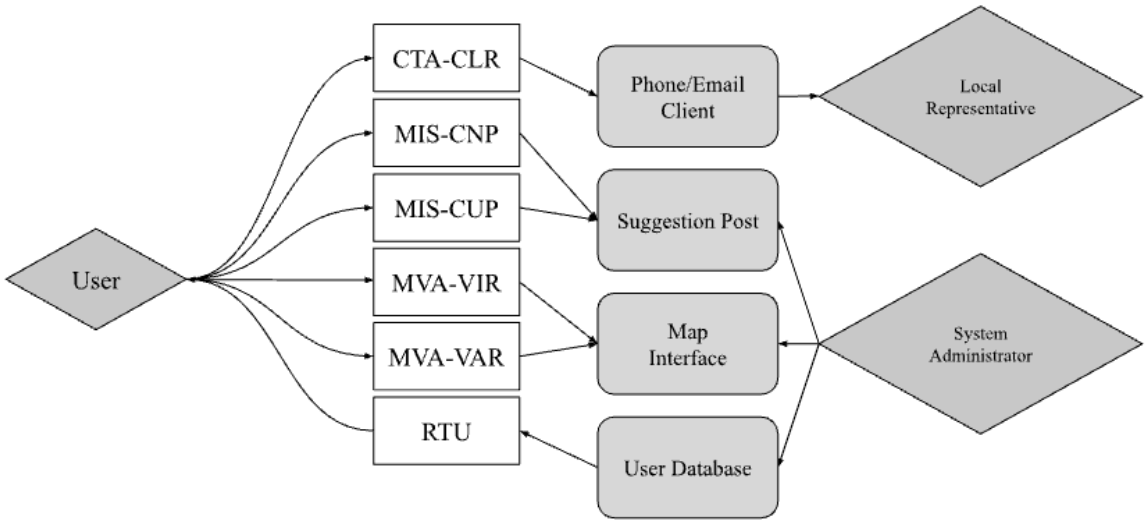


The essential archetypes of the system are Posts, Markers, and Ratings (alternatively described as classes in §9.1.1), which together provide views of user target areas that are both qualitative and quantitative. The functionality represented by these archetypes is illustrated and developed in the form of use cases in §8. To fulfill the aforementioned Community Building requirement, a “Reply” subclass must be defined to be owned by Posts.

8. DETAILED SYSTEM REQUIREMENTS – USE CASES

8.1. REQUIREMENT USE CASES

8.1.1. Use Case Diagrams



In the use case diagram above, actors are denoted by diamonds, use cases are denoted by rectangles, and information/systems are denoted by rounded rectangles. Arrows represent the flow of information and decisions.

8.1.2. Use Case Descriptions

Make Infrastructural Suggestion—Create New Post (MIS-CNP)		
Description	Iteration: 1, last modification: Oct. 14 by E. Wilson. Primary actor: End user (or "user"). Goal in context: To create and post an infrastructural suggestion. Trigger: User is dissatisfied with perceived infrastructural shortcomings.	
Pre-Conditions	User is logged into the *Winfra* system; user has location services enabled; user location matches target location.	
Flows	**Basic or Normal Flows**	1. The user logs into *Winfra* (see use case **ULA**). 2. The user selects the "post" button from the major function buttons. 3. The system displays a text editor. 4. The user writes and customizes their post detailing the infrastructure problem including problem, severity, and images. 5. The user selects the "submit" button.
	Alternative Flows	1. The user selects an existing post on the map interface—see **MIS-CUP**.
Post Conditions	New user post is to be entered into the database and displayed on the map.	
Special Requirement	1. *Security*: Unfinished/discarded posts must be properly disposed and deleted. 2. *Usability*: The text editor must be simple and familiar. 3. *Maintainability*: The target location must be an attribute of the post.	
Extension Points	1. Location services are not enabled—optional **Enable Location Services (ELS)** use case.	

Call To Action—Contact Local Representative (CTA-CLR)		
Description	Iteration: 1, last modification: Oct. 14 by J. Blancaflor. Primary actor: *Winfra* system. Goal in context: To prompt end user to contact local representatives about their infrastructure concerns. Trigger: User selects the "submit" button when creating a post (Basic Flow 7 in **MIS-CNP**).	
Pre-Conditions	User is logged into the *Winfra* system and has just posted a new infrastructural suggestion; user has phone and/or email services enabled.	
Flows	**Basic or Normal Flows**	1. The user logs into *Winfra* (see use case **ULA**). 2. The user submits a new post (see use case **MIS-CNP**). 3. The system displays the CTA modal with options to contact a local representative. 4. The user selects the "Call" button. 5. The user is redirected to their phone client. 6. The user makes a call to their local representative (exits scope of *Winfra*).
	Alternative Flows	1. The user selects the "Email" button from the modal. They are redirected to their email client, where their post has been copied into a new draft to their local representative (exits scope of *Winfra*).
Post Conditions	The user is in contact with a local representative regarding their infrastructure concerns.	
Special Requirement	1. Security: The system must protect the privacy of users' contact information and correspondences. 2. Performance: The display of the modal should occur immediately after the user submits a new post in order to retain their attention.	
Extention Points	None	

Make Infrastructural Suggestion—Comment Under Post (MIS-CUP)		
Description	Iteration: 1, last modification: Oct. 14 by E. Wilson. Primary actor: End user (or "user"). Goal in context: To comment under an existing infrastructural suggestion. Trigger: User reacts to a sentiment held by another user.	
Pre-Conditions	User's target location has outstanding suggestions.	
Flows	**Basic or Normal Flows**	1. The user logs into *Winfra* (see use case **ULA**). 2. The user navigates to their target location. 3. The user selects an existing post at their target location. 4. The user reads the suggestion contained in the selected post. 5. The user selects the "Reply" button under the post or an existing reply. 6. The system displays a text editor. 7. The user writes and customizes their post. 8. The user selects the "submit" button.
	Alternative Flows	1. No post exists at the user's target location—see **MIS-CNP**. 2. The user selects the "Rate" button from the major function buttons—see **MVA-VIR, MVA-VAR**.
Post Conditions	The user's post is public and can be viewed by other users, including local representatives and contractors.	
Special Requirement	1. *Usability*: The user must be able to read the post they are replying to while writing their reply. 2. Maintainability: There must be an ownership relationship between "Posts" and "Comments".	
Extention Points	1. Location services are not enabled—optional **Enable Location Services (ELS)** use case.	

Map-View Analysis—View Infrastructure Rating (MVA-VIR)		
Description	Iteration: 1, last modification: Oct. 14 by R. Mukkamala. Primary actor: End user (or "user"). Goal in context: To analyze the infrastructure rating of an area as reported by *Winfra* users. Trigger: User logs onto *Winfra*.	
Pre-Conditions	User is logged into the *Winfra* system; user has location services enabled.	
Flows	**Basic or Normal Flows**	1. The user logs into *Winfra* (see use case **ULA**). 2. The user navigates to the target location. 3. The user selects the "Rate" button from the major function buttons. 4. The system presents options for infrastructure and accessibility. 5. The user selects the "Infrastructure" button. 6. The system presents a review of the target location based on *Winfra* posts made in the selected bounds.
	Alternative Flows	1. The user selects the "Accessibility" button—see **MVA-VAR**.
Post Conditions	The user has learned qualitative information about the infrastructural features of their target location.	
Special Requirement	1. *Usability*: The view of the target location must reduce the analytical work that the user would undertake by reviewing the suggestion map as presented to them. 2. *Maintainability*: The collection and manipulation of data must remain efficient as posts grow more dense at target locations.	
Extention Points	1. Location services are not enabled—optional **Enable Location Services (ELS)** use case.	

Map-View Analysis—View Accessibility Rating (MVA-VAR)		
Description	Iteration: 1, last modification: Oct. 13 by E. Wilson. Primary actor: End user (or "user"). Goal in context: To analyze the accessibility of an area as reported by *Winfra* users. Trigger: User logs onto *Winfra*.	
Pre-Conditions	User is logged into the *Winfra* system; the user has location services enabled.	
Flows	**Basic or Normal Flows**	1. The user logs into *Winfra* (see use case **ULA**). 2. The user navigates to their target location. 3. The user selects the "Rate" button from the major function buttons. 4. The system presents options for infrastructure and accessibility. 5. The user selects the "Accessibility" button. 6. The system presents a review of the target location based on *Winfra* posts made in the selected bounds.
	Alternative Flows	1. The user selects the "Infrastructure" button—see **MVA-VIR**.
Post Conditions	The user has learned qualitative information about the accessibility of their target location.	
Special Requirement	1. *Usability*: The view of the target location must reduce the analytical work that the user would undertake by reviewing the suggestion map as presented to them. 2. *Maintainability*: The collection and manipulation of data must remain efficient as posts grow more dense at target locations.	
Extention Points	1. Location services are not enabled—optional **Enable Location Services (ELS)** use case.	

Real-Time Update (RTU)		
Description	Iteration: 1, last modification: Oct. 14 by S. Orpi. Primary actor: *Winfra* system. Goal in context: To notify the end user that a change has been made relevant to their outstanding suggestion(s). Trigger: Infrastructure that a user has reviewed has been changed.	
Pre-Conditions	User has notification services enabled.	
Flows	**Basic or Normal Flows**	1. The *Winfra* system receives notice of an update to an infrastructural feature with outstanding suggestions. 2. The *Winfra* system notifies all users that have posted or replied to suggestions regarding this feature that updates have been made. 3. The user selects the pop-up notification. 4. The system displays the suggestion post that the user has previously interacted with, now including the update to the infrastructural feature in question.
	Alternative Flows	1. The user is not logged into *Winfra*—a system notification is sent to the user.
Post Conditions	The user is notified about an update made concerning their suggestion.	
Special Requirement	1. *Security:* Users should not see who else has been notified regarding updates to the feature in question. 2. *Usability*: Users should not receive redundant updates concerning multiple suggestions about the same infrastructural feature.	
Extention Points	1. The user does not have notifications enabled for *Winfra*—optional **Enable Notification Services (ENS)** use case.	

9. SYSTEM MODEL (UML)

9.1. STATIC – CLASS DIAGRAMS

The following are candidate classes for the *Winfra* UML class model, represented in list form and as static class diagrams.

User

Attributes: User ID, User Name, Phone Number, Email, Posts, Comments

Methods: editContactInfo(), getLocation(), createPost(), removePost(), getPosts()

Post

- Attributes: Post ID , User ID, Location, Subject, Media, Rating, Description,Comments, Status, Local Representative Information
- Methods: removePost(), getComment(), notifyUsers(), getRepInfo()

Comment

- Attributes: Comment ID, Post ID, User ID, Content
- Methods: removePost(), getComments(), notifyUsers()

Map

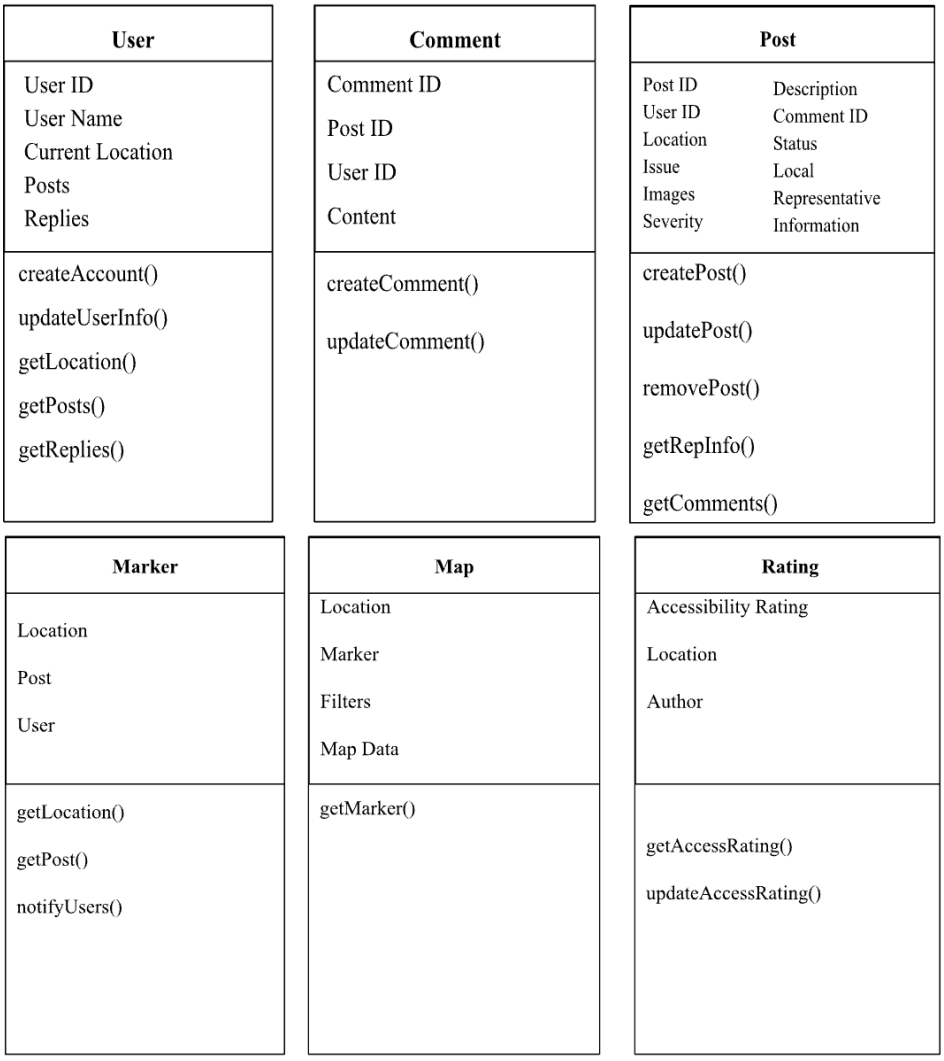
- Attributes: Areas, Markers, Filters
- Methods: getMarkers(), rateArea()

Marker

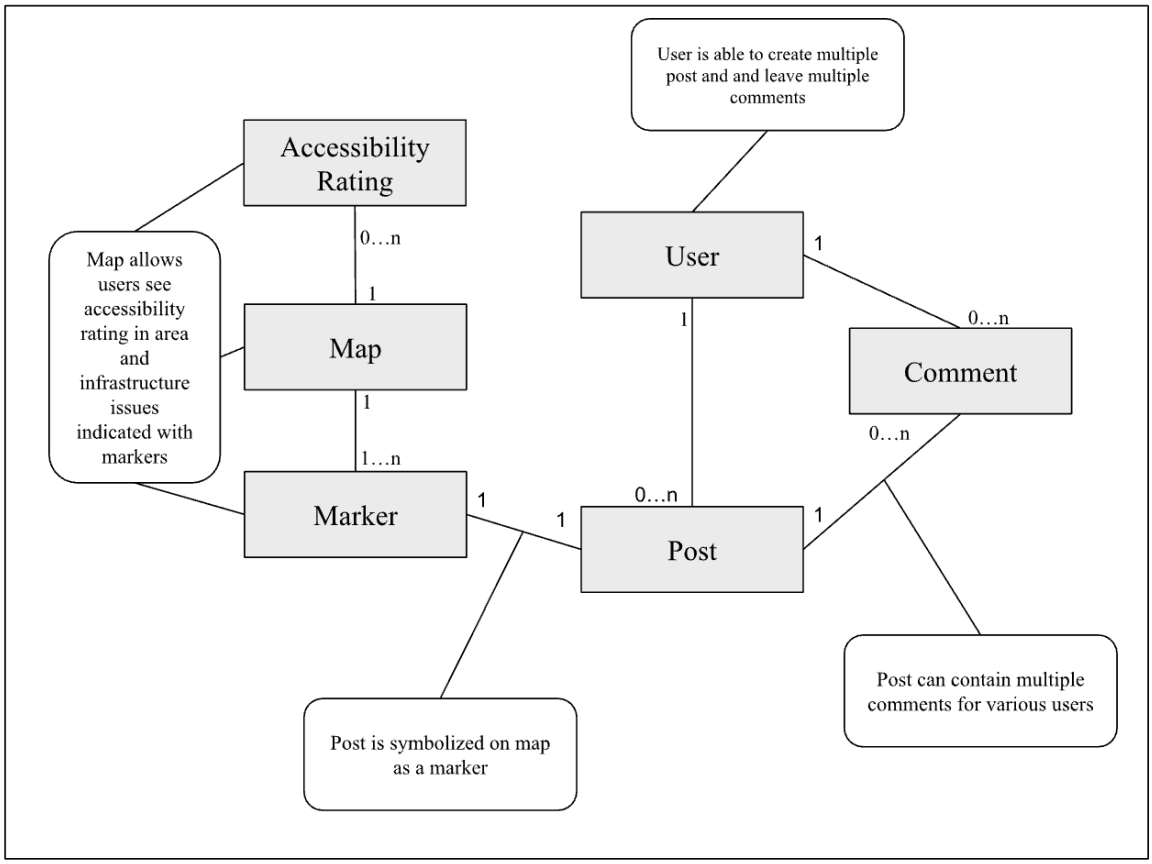
- Attributes: Location, Posts, Users
- Methods: getLocation(), getPost(), notifyUsers()

Rating

- Attributes: Rating, Location, User Location, Posts, Users
- Methods: getAccessRating(), updateAccessRating()



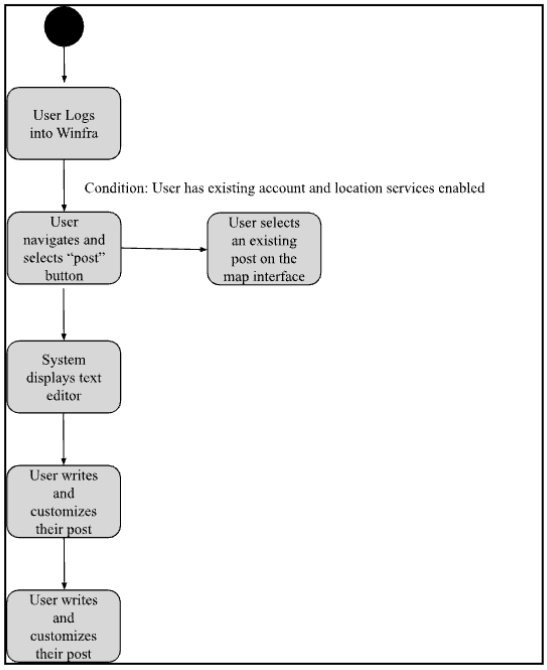
Class Interaction Diagram



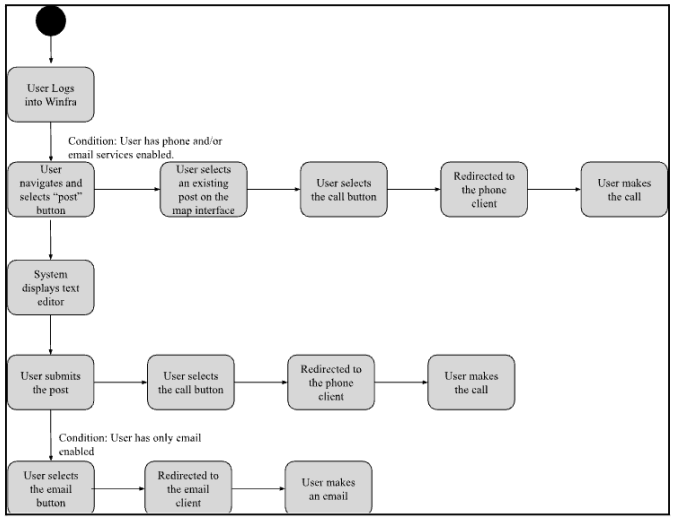
9.2. DYNAMIC – BEHAVIORAL MODELS

Event Diagrams

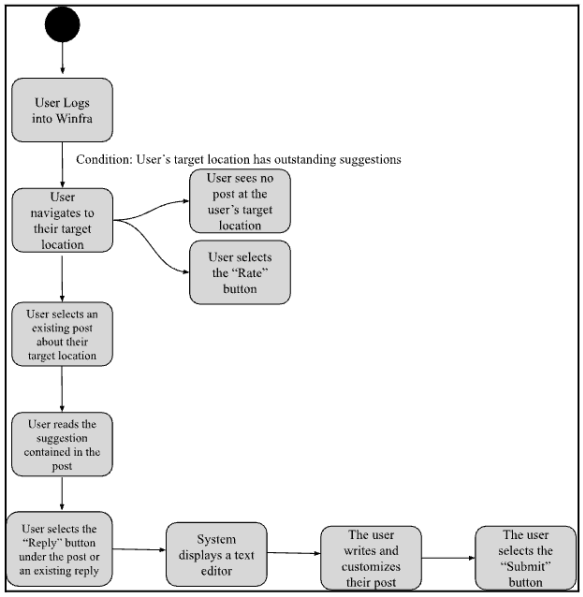
MIS-CNP



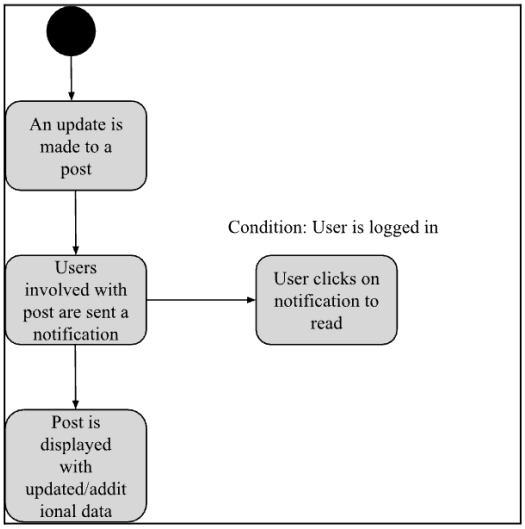
CTA



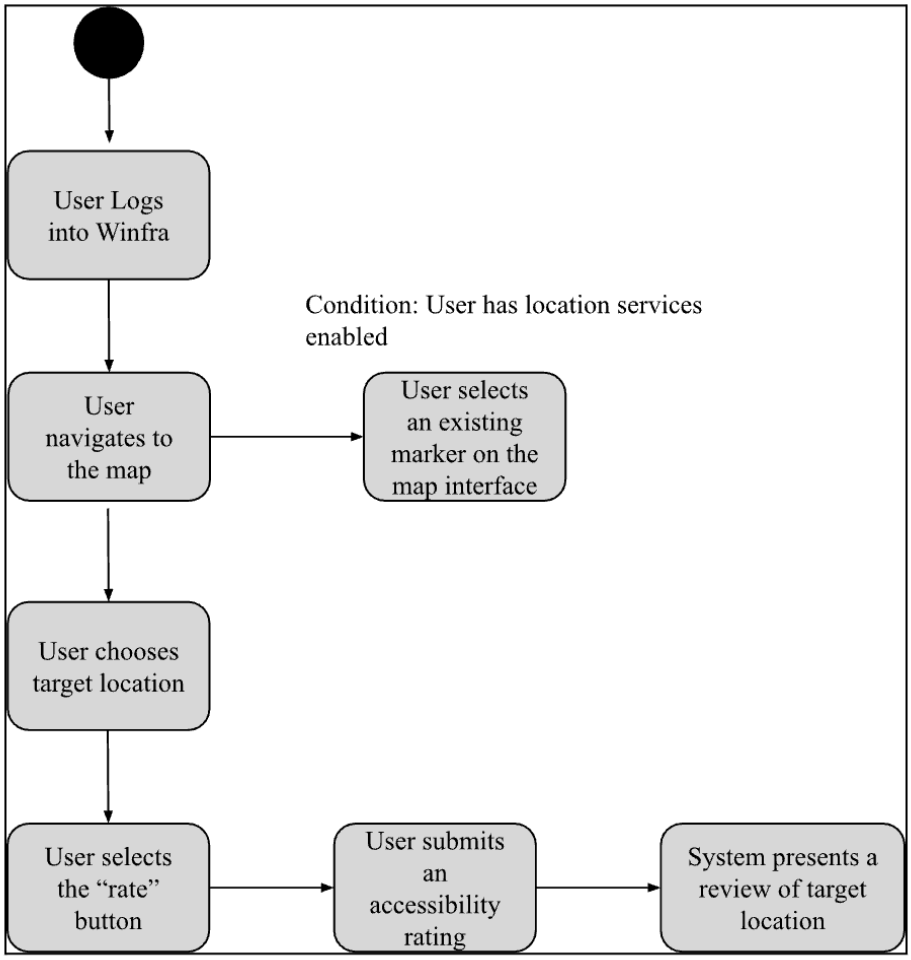
MIS-CUP


User Logs into Winfra
Condition: User's target location has outstanding suggestions
User navigates to their target location
User sees no post at the user's target location
User selects the "Rate" button
User selects an existing post about their target location
User reads the suggestion contained in the post
User selects the "Reply" button under the post or an existing reply
System displays a text editor
The user writes and customizes their post
The user selects the "Submit" button

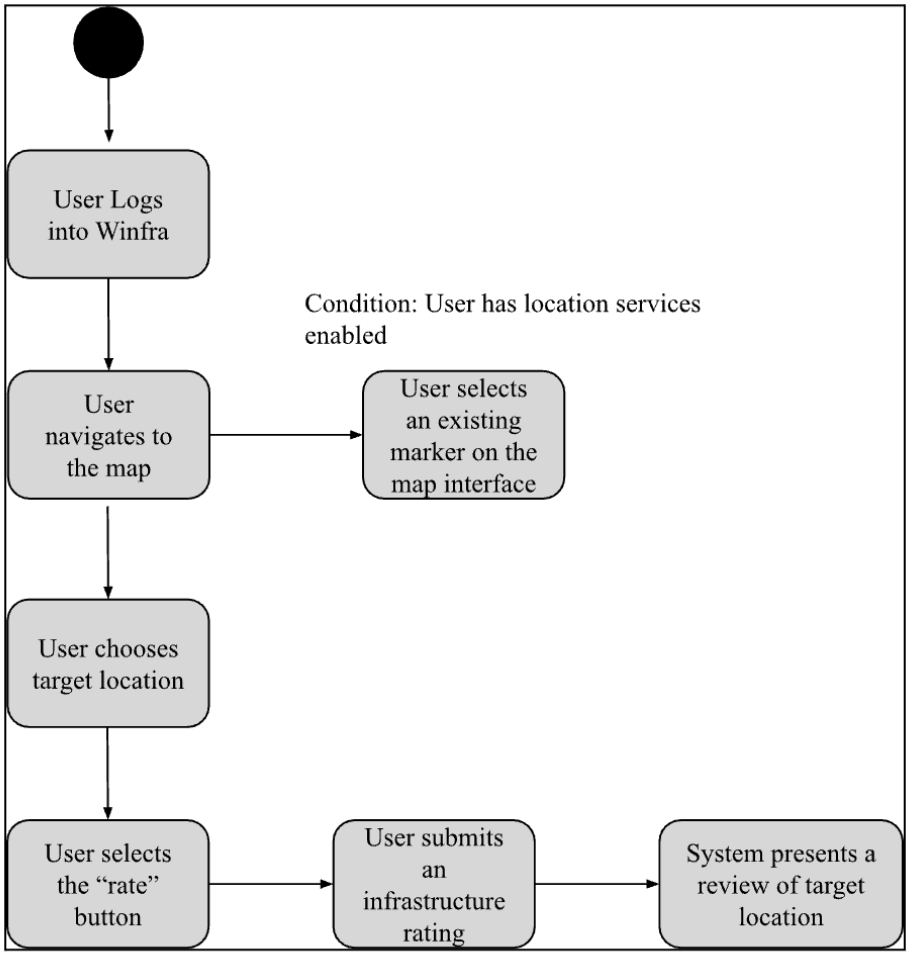
RTU


An update is made to a post
Condition: User is logged in
Users involved with post are sent a notification
User clicks on notification to read
Post is displayed with updated/additional data

MVA-VAR

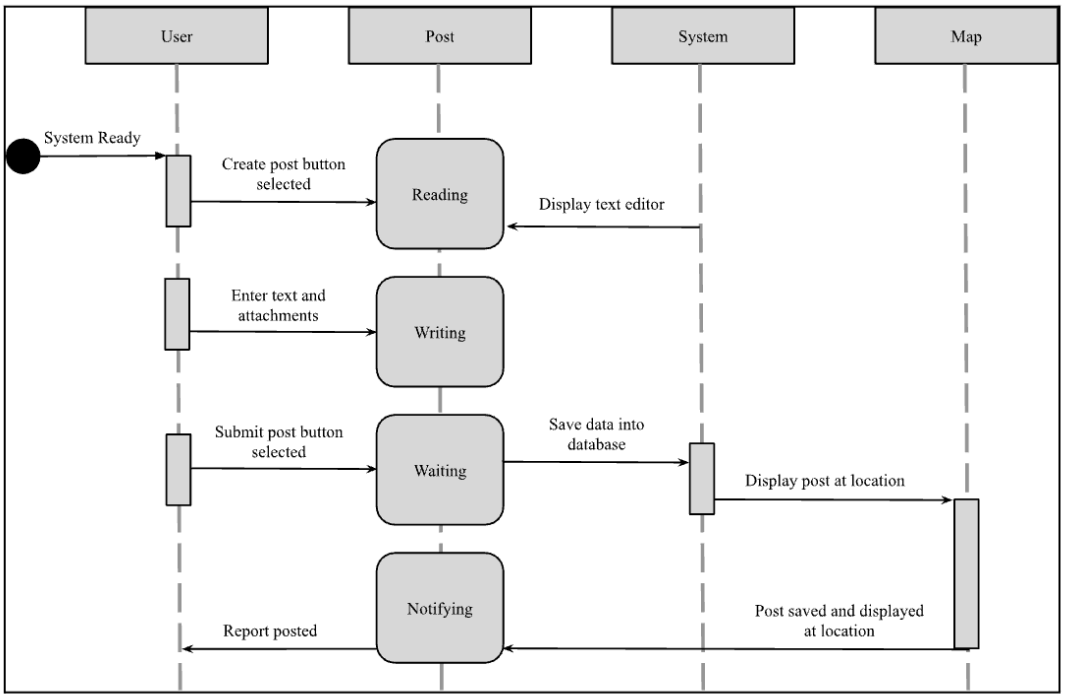

User Logs into Winfra
Condition: User has location services enabled
User navigates to the map
User selects an existing marker on the map interface
User chooses target location
User selects the “rate” button
User submits an accessibility rating
System presents a review of target location

MVA-VIR

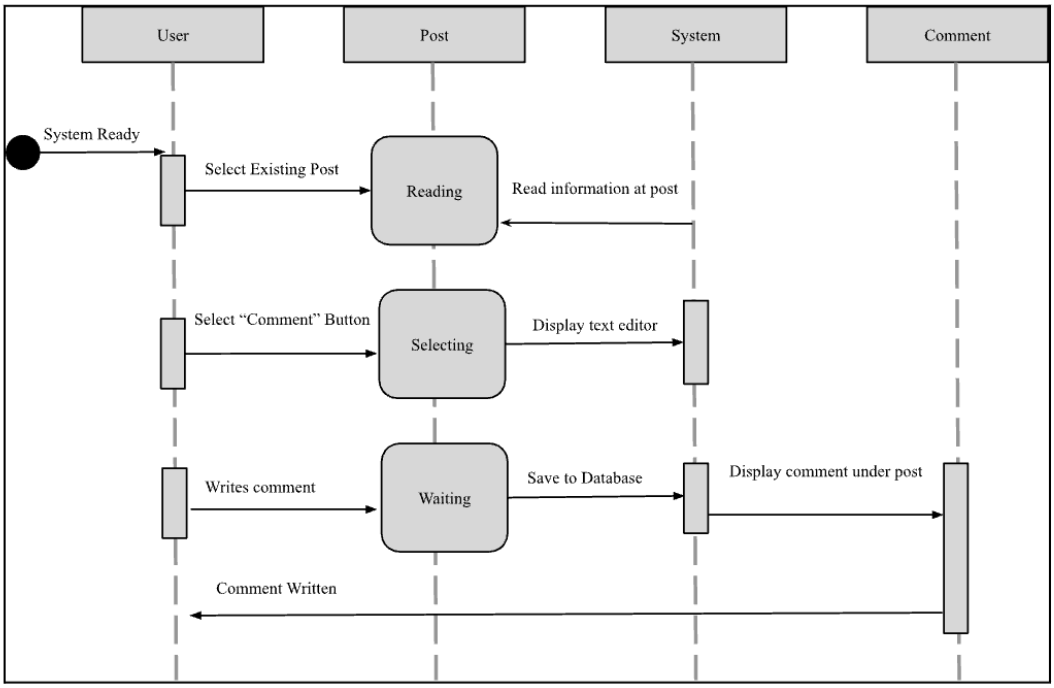

User Logs into Winfra
Condition: User has location services enabled
User navigates to the map
User selects an existing marker on the map interface
User chooses target location
User selects the “rate” button
User submits an infrastructure rating
System presents a review of target location

Sequence Diagrams

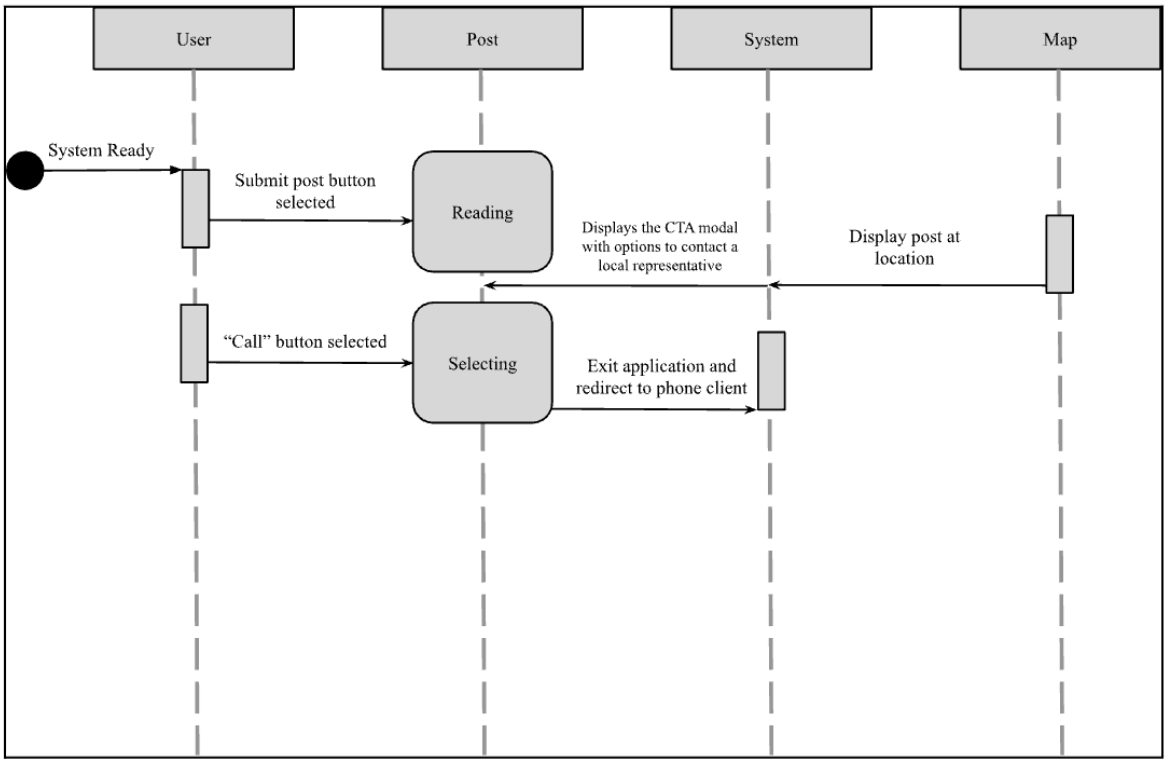
MIS-CNP



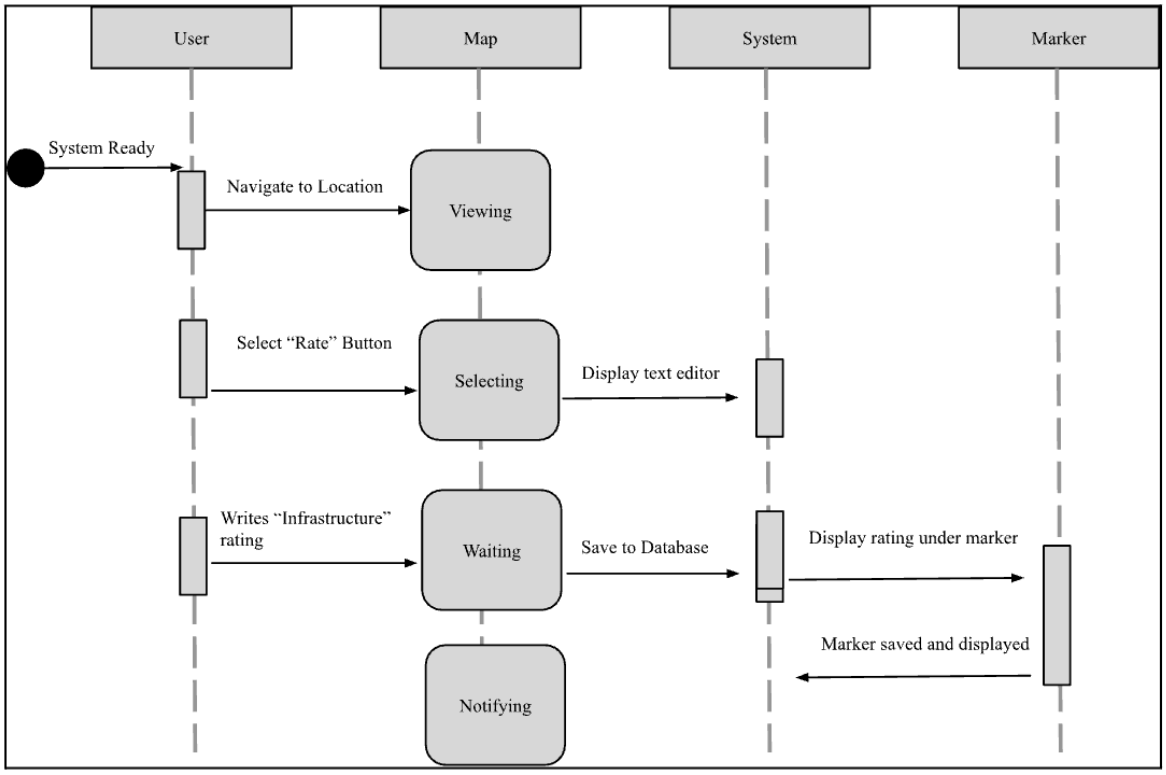
MIS-CUP


User
Post
System
Comment
System Ready
Select Existing Post
Reading
Read information at post
Select “Comment” Button
Selecting
Display text editor
Writes comment
Waiting
Save to Database
Display comment under post
Comment Written

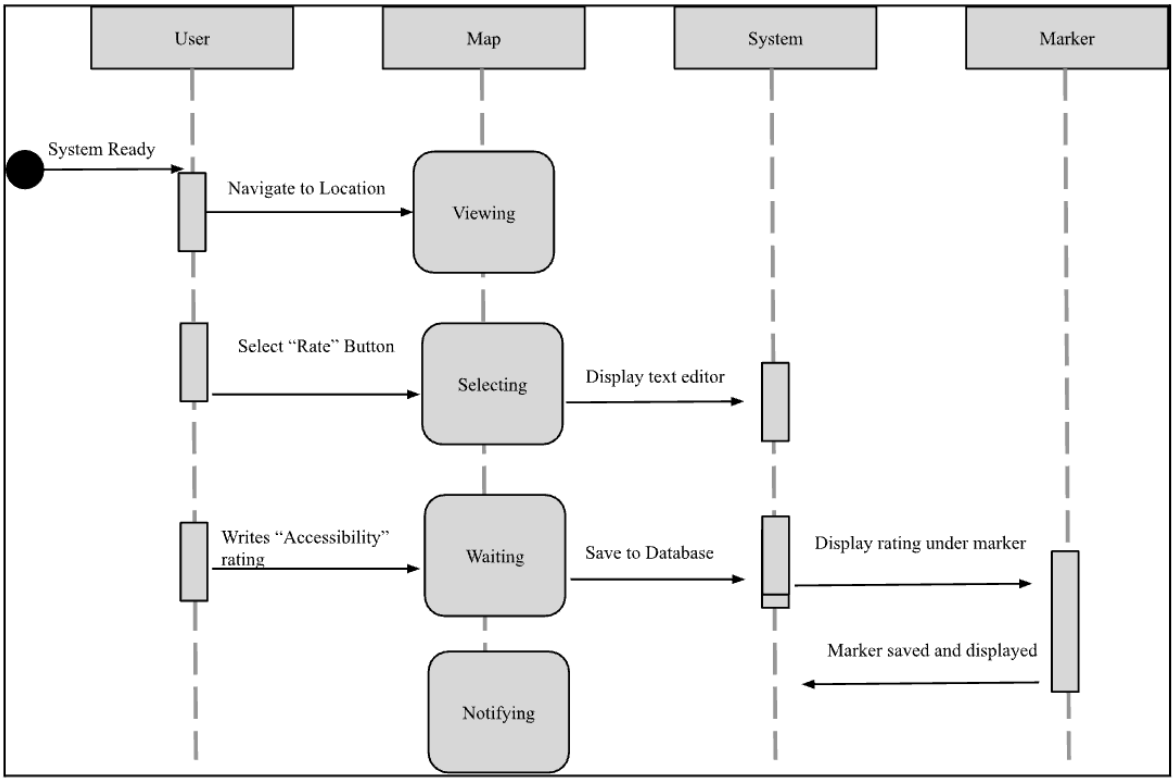
CTA


User
Post
System
Map
System Ready
Submit post button selected
Reading
Displays the CTA modal with options to contact a local representative
Display post at location
"Call" button selected
Selecting
Exit application and redirect to phone client

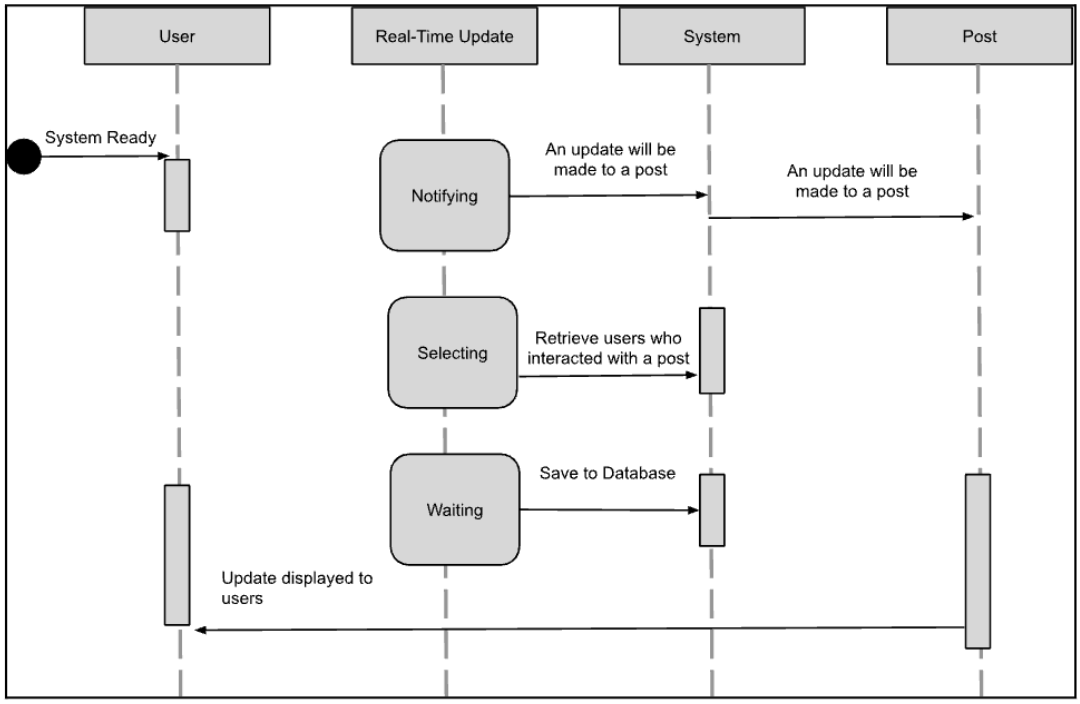
MVA-VIR


User
Map
System
Marker
System Ready
Navigate to Location
Viewing
Select “Rate” Button
Selecting
Display text editor
Writes “Infrastructure” rating
Waiting
Save to Database
Display rating under marker
Marker saved and displayed
Notifying

MVA-VAR

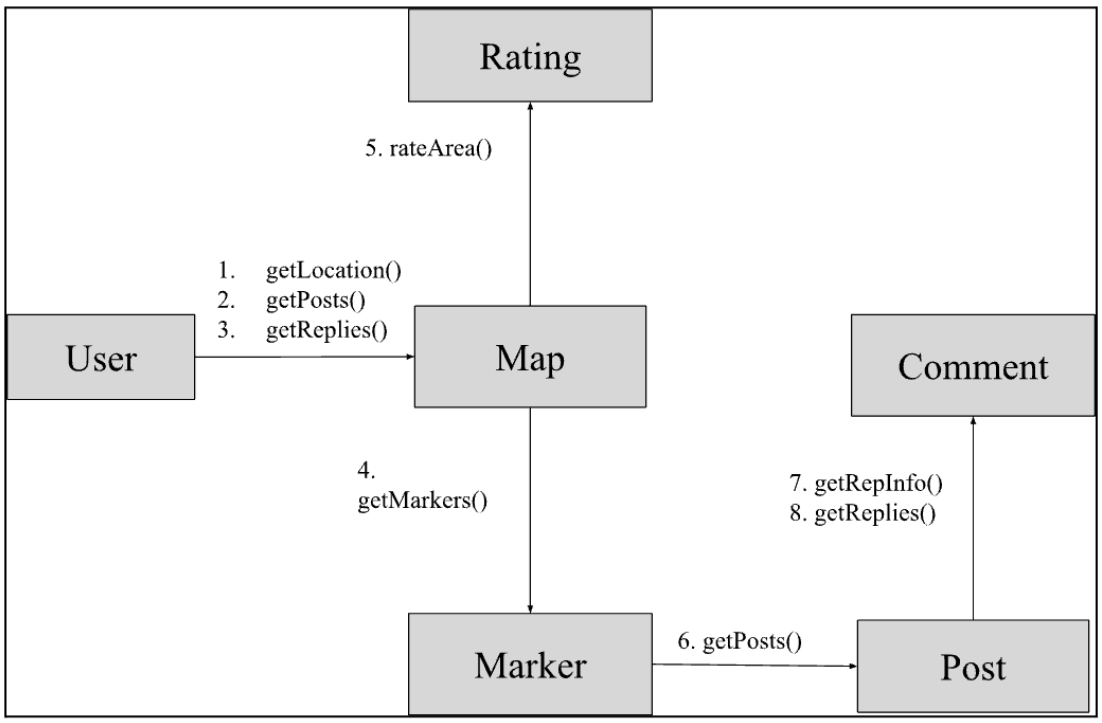

User
Map
System
Marker
System Ready
Navigate to Location
Viewing
Select "Rate" Button
Selecting
Display text editor
Writes "Accessibility" rating
Waiting
Save to Database
Display rating under marker
Marker saved and displayed
Notifying

RTU


User
Real-Time Update
System
Post
System Ready
Notifying
An update will be made to a post
An update will be made to a post
Selecting
Retrieve users who interacted with a post
Waiting
Save to Database
Update displayed to users

Collaboration Diagram

The collaboration diagram below depicts the flow of information between independent components of the system.



10. EVOLUTION OF THE SRS

Any of the stakeholders of the project must gain majority approval among all stakeholders in order to make changes to the SRS. These changes can include updates to the requirements, UML diagrams, or traceable work products. In the event of majority approval, regulations regarding version control and schedule/defect tracking must be observed. Substantial alterations must be indicated by the incrementation of the release version. Project management software should be used to record and organize these changes in a change log. We require that all team members be notified of changes that affect the development process. Adherence to these guidelines will reduce confusion and promote organization and progress among the team.

11. RATIONALE

None at this time

12. NOTES

None at this time

13. APPENDICES

13.1. SYSTEM TEST PLAN REQUIREMENTS

The software quality group will ensure that the objectives and requirements are met within the system and working according to the clients specifications.

Real-world scenario tests will be conducted to simulate user interactions and edge cases, such as logging infrastructure issues or interacting with a map API. This testing will help validate the performance and reliability of the system under typical and extreme conditions.

The system will also be stress-tested with simulated users to ensure the application can handle various scenarios of users on the application as well as ensure the information they provide is being logged properly in the back-end database. Simulations through various devices will also be tested to ensure the application works across platforms and is accessible to a wide range of end users.

Product testing will focus on verifying that all system components function as intended. Once the system is working as intended, it is ready for deployment to end users. For acceptance testing, the website will be presented to potential end users in beta to ensure it meets the requirements outlined by the clients and fix any bugs or errors they may encounter.

13.2. QUALIFICATION PROVISIONS

1. **Self-check:** Each member of the quality assurance team will review their own work respective to their assigned task, checking for accuracy and sufficiency, and identifying vulnerabilities and redundancies in their implementations.

2. **Peer review:** After the self-check is completed, the task will then be peer reviewed by another team member within the quality assurance team to ensure that the task is correct, consistent and complete as specified by the requirements. This step will also ensure that the document is modifiable and that the system can be stably adjusted when necessary.

3. **Walkthrough:** Once the peer review is completed and all the various tasks work accordingly, the quality assurance team will conduct a walkthrough of each section of the web application. This measure will allow stakeholders to verify that all system requirements are met and correctly completed. This will ensure that there are no ambiguities and or inconsistencies in the application.

4. **Inspection:** The last step will be a formal inspection of the application. Using a structured checklist, the team will ensure that the SRS meets all quality criteria: it is correct, verifiable, traceable, and modifiable. This inspection serves as the final validation, ensuring that the document is ready for use as the foundation of the development process.

13.3. REQUIREMENTS TRACEABILITY

The requirements traceability matrix below illustrates how elements of the *Winfra* project are traceable forward to work products and backward to requirements.

Requirements Traceability Matrix

Requirement ID	**Requirement Desc.**	**Use Case ID**	**Deliverable** (*None at this time)*
Req. 1.0	Infrastructural Suggestion	**MIS-CNP**	
Req. 2.0	Community Building	**MIS-CUP**	
Req. 3.0	Interactive Map	**MVA-VIR, MVA-VAR**	
Req. 4.0	Promotion of Accessibility	**MVA-VAR**	
Req. 5.0	Real-Time Updates	**RTU**	
Req. 6.0	Contacting Local Representatives	**CTA-CLR**	

13.4. SCHEDULE TRACKING

Hours

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference
SRS - Domain	Jenesis Blancaflor	2.5 hrs	4 hrs	+1.5 hrs
	Ruthvik Mukkamala	3 hrs	2.5 hrs	-0.5 hrs

	Sanjida Orpi	2.5 hrs	3 hrs	+0.5 hrs
	Elijah Wilson	3 hrs	2.5 hrs	-0.5 hrs
	Summary for the Entire Team	11 hrs	12 hrs	+1.0 hrs

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference
SRS - Requirements	Jenesis Blancaflor	2 hrs	2 hrs	+0 hrs
	Ruthvik Mukkamala	2 hrs	1.5 hrs	-0.5 hrs
	Sanjida Orpi	2 hrs	2.5 hrs	+0.5 hrs
	Elijah Wilson	2 hrs	3.0 hrs	+1.0 hrs
	Summary for the Entire Team	8 hrs	9.0 hrs	+1.0 hrs

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference
SRS - Analysis	Jenesis Blancaflor	3.5 hrs	6 hrs	+2.5 hrs
	Ruthvik Mukkamala	2 hrs	5 hrs	+3 hrs
	Sanjida Orpi	2 hrs	6 hrs	+4 hrs

	Elijah Wilson	2 hrs	5 hrs	+3 hrs
	Summary for the Entire Team	9.5 hrs	22 hrs	+12.5 hrs

Cumulative

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference
SRS	Jenesis Blancaflor	10 hrs	12 hrs	+2 hrs
	Ruthvik Mukkamala	7 hrs	9 hrs	+2 hrs
	Sanjida Orpi	9 hrs	12 hrs	+3 hrs
	Elijah Wilson	7 hrs	10.5 hrs	+3.5 hrs
	Summary for the Entire Team	33 hrs	43.5 hrs	+10.5 hrs

13.5. DEFECT TRACKING

Counts

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference

SRS - Domain	Jenesis Blancaflor	3 Counts	1 Count	-2 Counts
	Ruthvik Mukkamala	3 Counts	0 Counts	-3 Counts
	Sanjida Orpi	3 Counts	0 Counts	-3 Counts
	Elijah Wilson	3 Counts	1 Count	-2 Counts
	Summary for the Entire Team	12 Counts	2 Counts	-10 Counts

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference
SRS - Requirements	Jenesis Blancaflor	2 Counts	2 Counts	+0 Counts
	Ruthvik Mukkamala	3 Counts	1 Count	-2 Counts
	Sanjida Orpi	2 Counts	0 Counts	-2 Counts
	Elijah Wilson	3 Counts	2 Counts	-1 Counts
	Summary for the Entire Team	10 Counts	5 Counts	-5 Counts

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference
SRS - Analysis	Jenesis Blancaflor	3 Counts	5 Counts	+2 Counts

	Ruthvik Mukkamala	4 Counts	5 Counts	+1 Count
	Sanjida Orpi	3 Counts	5 Counts	+2 Counts
	Elijah Wilson	4 Counts	4 Counts	0 Counts
	Summary for the Entire Team	14 Counts	17 Counts	+3 Counts

Cumulative

Artifact or Deliverable	Who (individual or Team)	Estimated	Actual	Difference
Cumulative - Summary	Jenesis Blancaflor	9 Counts	8 Counts	-1 Counts
	Ruthvik Mukkamala	10 Counts	6 Counts	-4 Count
	Sanjida Orpi	8 Counts	5 Counts	-3 Counts
	Elijah Wilson	10 Counts	7 Counts	-3 Counts
	Summary for the Entire Team	38 Counts	26 Counts	-12 Counts

13.6. DICTIONARIES

Classes

Name	Description	Methods	Attributes
User	Account on the *Winfra* system	editContactInfo(), getLocation(), createPost(), removePost(), getPosts()	User ID, User Name, Phone Number, Email, Posts, Comments , Likes
Post	Primary function of *Winfra*, contains qualitative and quantitative reviews of infrastructural features	removePost(), getComments(), notifyUsers(), getRepInfo()	Post ID , User ID, Location, Subject, Media, Rating, Description, Comments, Status, Local Representative Information
Comment	Subclass of Post; instances belong to Post instances	removePost(), getComments(), notifyUsers()	Comment ID, Post ID, User ID, Content
Marker	Pin on the map that holds posts concerning a common infrastructural feature	getLocation(), getPost(), notifyUsers()	Location, Posts, Users
Rating	Quantitative user opinion of an infrastructural feature	getAccessRating(), updateAccessRating()	Rating, Location, User ID
Map	Home display containing all markers/posts	getMarkers(), rateArea()	Areas, Markers, Filters

Methods

Name	Description	Class	Arguments
editContactInfo()	Edit contact information of the user	User	ContactInfo

getLocation()	Get location of the user on the map	User	N/A
createPost()	Generate a user post	User	N/A
deletePost()	Delete a user post	User	Post ID
getPost()	Return the indicated post(s)	Marker	Marker ID
removePost()	Remove the indicated post	User, Post	Post ID (N/A if caller is a Post)
getComments()	Get all the comments under a post	Post	Post ID
notifyUsers()	Notify all the users included in a post	Post	Post ID
getRepInfo()	Get representatives information such as cell phone and/or email	Post	Marker ID
getAccessRating()	Get the accessibility rating	Rating	Marker ID
updateAccessRating()	Update the accessibility rating	Rating	Marker ID
getMarkers()	Get the makers of a certain geographic location	Map	Area
rateArea()	Compute rating for target area	Map	Area

Attributes

Name	**Description**	**Simple/Complex**	**Type**

User ID	Unique identification for a user	Simple	Integer
User Name	First and last name of user	Simple	String
Phone Number	User's phone number	Simple	String
Email	User's email	Simple	String
Posts	Posts user has submitted	Complex	Array of Post instances
Comments	Comments under a Post	Complex	Array of Comment instances
Post ID	Identification number of a post	Simple	Integer
Location	Current user location	Complex	Tuple of Floats
Subject	Subject line / topic discussed in suggestion	Simple	String
Media	User-uploaded files to supplement text suggestions	Complex	Array of Media types e.g. Images, Audio Files
Rating	Numerical value	Simple	Integer
Status	Status of infrastructure	Simple	String

Local Representative Information	Name, phone number, email of local representative	Complex	Dictionary of Name, Phone Number, and Email
Comment ID	Unique Identifier for user's comment	Simple	Integer
Comment Content	Text field input from user under post	Simple	String
Areas	Rectangular Map regions framed by device screen	Complex	Tuple of Tuples of Floats (Boundary Coordinates)
Markers	Locations of the pinned locations on the map	Complex	Array of Tuples of Floats
Filters	Switch to determine mode of Map analysis	Simple	String, Integer, or Boolean
Users	Users who have expressed interest in a Marker/Post	Complex	Array of User instances
Posts	Post(s) from which numerical rating was computed	Complex	Array of Post instances

14. INDEX