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COM397
Systems Development
Assignment 1 – Litter Smart

TEAM DAVID

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I. Introduction

This assignment is about designing an app which helps keep the city clean by letting users report litter sightings to the authorities, who then send cleaners to where the sightings took place to take care of said litter spots.

II. Requirement Engineering

Requirements	Requirement Type	Priority Level
General users shall be able to create an account Rationale: An account is needed in order to identify the litter sighting reporter. Fit Criterion: Users are able to enter a username and a password which then get stored in a database as their login details.	Functional	M
General users shall be able to report litter sightings Rationale: This is the central idea of the app. Fit Criterion: The user can take a picture of the litter, write a description, mark their location on the map, let Google identify their location, or a combination of any of these.	Functional	M
General users should be able to view the status of their reported sightings Rationale: This is the way the user would get feedback after their report. Fit Criterion: A menu inside the app displays all of the sightings reported by that user, all under different tabs such as “Complete”, “In progress” or “Awaiting verification”.	Non-Functional	S
General users should be able to report litter sightings while offline and upload it later Rationale: There can be a scenario in which the user does not have immediate internet connection upon sighting litter. Fit Criterion: The user report gets stored on their device and when they connect to the network the app asks their permission to upload the report.	Non-Functional	C

Admins shall be able to monitor the system Rationale: It is essential for admins to be able to do their job. Fit Criterion: The reported litter sightings are visible to the admins.	Functional	M
Admins shall be able to verify sightings Rationale: There might be false reports, duplicates, or inaccurate details which need to be sorted out by the admin before a cleaner gets sent to the location. Fit Criterion: For each of the reported sightings, there is an option for the admin to verify them, dismiss them and give feedback to the user. Depending on the action the admin chose to take, the report would get placed in the appropriate category, such as “Verified”, “Unverified” or “Dismissed”.	Functional	M
Admins should be able to see the statistics produced on a reporting dashboard Rationale: This would help the authorities prepare with the best strategy according to the relevant circumstances. Fit Criterion: There is a section on the admin side of the app which consists of details of past litter reports, including most frequent spots of littering, frequency of littering in an area, the average time it takes to clean up a reported area, etc.	Functional	S
Cleaners shall be assigned to litter sightings Rationale: Every cleaner has to be aware of what their job is. Fit Criterion: The cleaner side of the app displays the litter sightings assigned to them, along with their precise details including their location on a map.	Functional	M

Cleaners should be able to access the fastest route to clean all litter spots that they have been assigned to Rationale: This would improve efficiency by preventing wasting time and fuel which would occur in case of a sub-optimal route. Fit Criterion: A pathfinding algorithm determines the shortest possible route the cleaner has to take in order to go through all of the spots on the map.	Non-Functional	S
The fastest route for cleaners should update in real-time in case of a need to re-route Rationale: A wrong turn from the cleaner can cause the shortest route to not be the shortest route anymore. Fit Criterion: The previously discussed pathfinding algorithm gets executed at a certain frequency, instead of just once.	Non-Functional	C
Users at all levels should receive push notifications about various activities occurring Rationale: This is a convenient way to notify the user without them having to open the app. Fit Criterion: A push notification is displayed on the screen even when the app is not open.	Non-Functional	C
The app shall have Google Maps API integration to allow displaying litter spots with custom markers and heat maps Rationale: A visual representation is much more useful for the user than an address or a set of coordinates. Fit Criterion: The app has Google Maps API integration, along with markers upon it, and a heat map.	Functional	M
The app shall authenticate users when they log into the system	Functional	M

Rationale: It is mandatory in order to ensure that every user, and only they can access their own respective accounts. Fit Criterion: If the user enters their correct login details, the system lets them in. Otherwise, they get an error message.		
The app should send a verification email upon registration Rationale: This is a safety measure to avoid registration with someone else's email without their knowledge. Fit Criterion: The user gets a verification email on the address they have provided at registration.	Non-Functional	S
Verification emails should be sent with a latency of no greater than a minute Rationale: Verification is part of the registration process; therefore, users should not be forced to wait in between submitting their registration and getting the verification email. Fit Criterion: The user receives a verification email in a timeframe of 60 seconds after registering.	Non-Functional	S
Each litter report should be processed within 20 second Rationale: The user submitting the report should not be made to wait because it might make them frustrated and potentially change their mind about submitting the litter sighting. Fit Criterion: The user's report is processed within 20 seconds after submission, and they get a "Submission successful" message.	Non-Functional	S
The app should load within 5 seconds when the number of simultaneous users is below 12000 Rationale: This is needed to minimize user frustration. Fit Criterion: The app loads within 5 seconds.	Non-Functional	S

The app should be regularly updated Rationale: There are constant improvements which are needed to be made. Fit Criterion: The app keeps up with the needs and suggestions of users in a timely manner.	Non-Functional	S
Users and cleaners should have the option to give feedback to help improve the app Rationale: This helps developers understand the perspective of general users. Fit Criterion: The app has an area where the user can submit their feedback.	Non-Functional	C
Users and cleaners should get points for their service, to keep them motivated Rationale: Some people are competitive and a point-based system might help their involvement. Fit Criterion: A point-based system is implemented, in which every cleaner and user get points for their completed work, or reported litter sighting.	Non-Functional	W

III. Risk Assessment

Risk Table

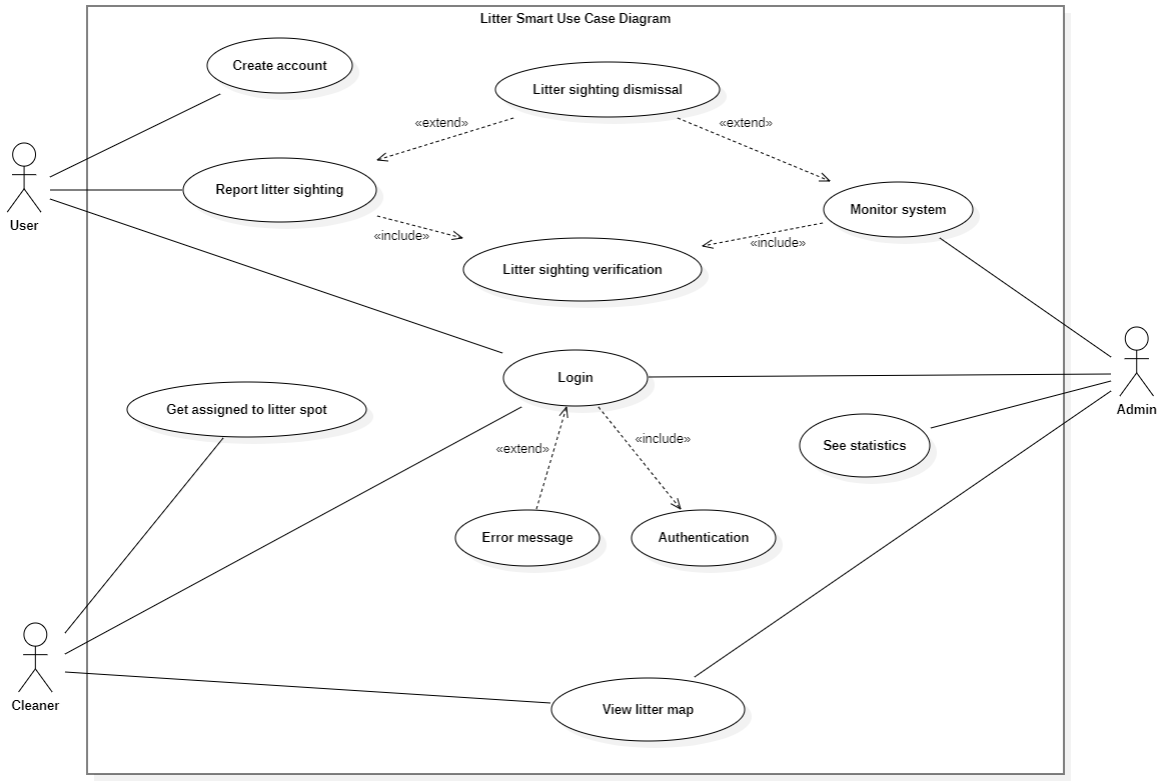
Risk Number	Risk	Likelihood	Impact	Mitigation Plan	Risk Level
R001	Forced reductions in the project budget occur	Rare	Catastrophic	Acceptance	5
R002	Staff with the required skills cannot be recruited	Rare	Catastrophic	Mitigation	5
R003	The management personnel changes	Unlikely	Major	Acceptance	8

R004	Redesign required	Possible	Major	Avoidance	12
R005	Staff absence at critical times	Possible	Major	Avoidance	12
R006	Software or hardware failure	Unlikely	Moderate	Mitigation	6
R007	Communication problems	Possible	Major	Mitigation	12
R008	Overly optimistic schedule	Probable	Major	Avoidance	16
R009	Going over budget	Possible	Major	Avoidance	12
R010	APIs that the app depends on stop working (Google Maps API in our case).	Rare	Moderate	Acceptance	3
R011	Having to change the database model. Switching from a relational to a non-relational database or vice versa.	Unlikely	Major	Avoidance	8
R012	Redundancy; different developers working on the same or a very similar component, where one person can do the job instead of many	Possible	Moderate	Avoidance	9
R013	Drastic updates to the platform, (iOS/Android), that might force the developers to recreate the app so it would work on the updated version of the platform.	Unlikely	Major	Acceptance	8

Risk Assessment Matrix

Likelihood	Impact				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
5 Almost Certain	5 Moderate	10 High	15 Extreme	20 Extreme	25 Extreme
4 Probable	4 Moderate	8 High	12 High	16 Extreme	20 Extreme
3 Possible	3 Low	6 Moderate	9 High	12 High	15 Extreme
2 Unlikely	2 Low	4 Moderate	6 Moderate	8 High	10 High
1 Rare	1 Low	2 Low	3 Low	4 Moderate	5 Moderate

Use Case Diagram



Use Case Template

Name: Litter sighting report
Description: Actor wants to report a litter sighting to the authorities.
Actors:

- User

Pre-Conditions
User is logged in and on the "Report Sighting" menu.
Basic Flow

1. User selects some photos from their gallery
2. User marks their location on the map, or turns on location on their phone
3. User turns on internet connection
4. User presses the Submit button (See EX1)
5. System determines that there are enough photos provided (See AC1)
6. System determines that there is a location provided (See AC2)
7. System checks if the device is connected to the internet (See AC3)
8. System displays a message about a successful submission

Post Conditions
User can now view their submission in its corresponding menu, along with its status.
Alternate Flows
AC1 System determines that there are not enough photos provided.

1. System displays error message
2. Return to Basic Flow step 1

AC2 System determines that there is no location provided.

1. System displays error message
2. Return to Basic Flow step 2

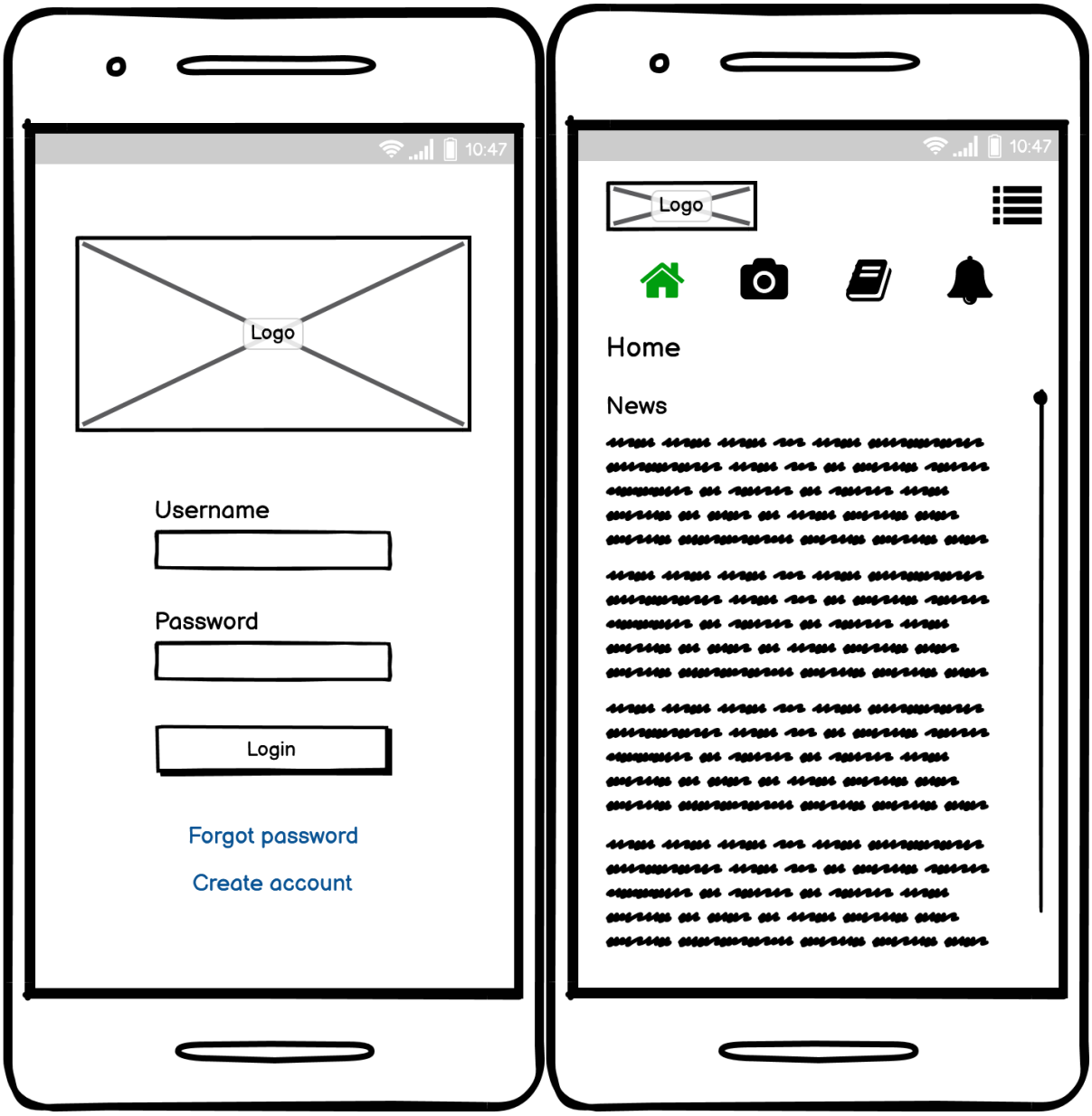
AC3 System determines that the device is not connected to the internet.

1. System displays error message
2. Return to Basic Flow step 3

Exceptions
EX1 User saves the report for later

1. System saves the report as draft
2. See "Save as Draft" Use Case

Wireframes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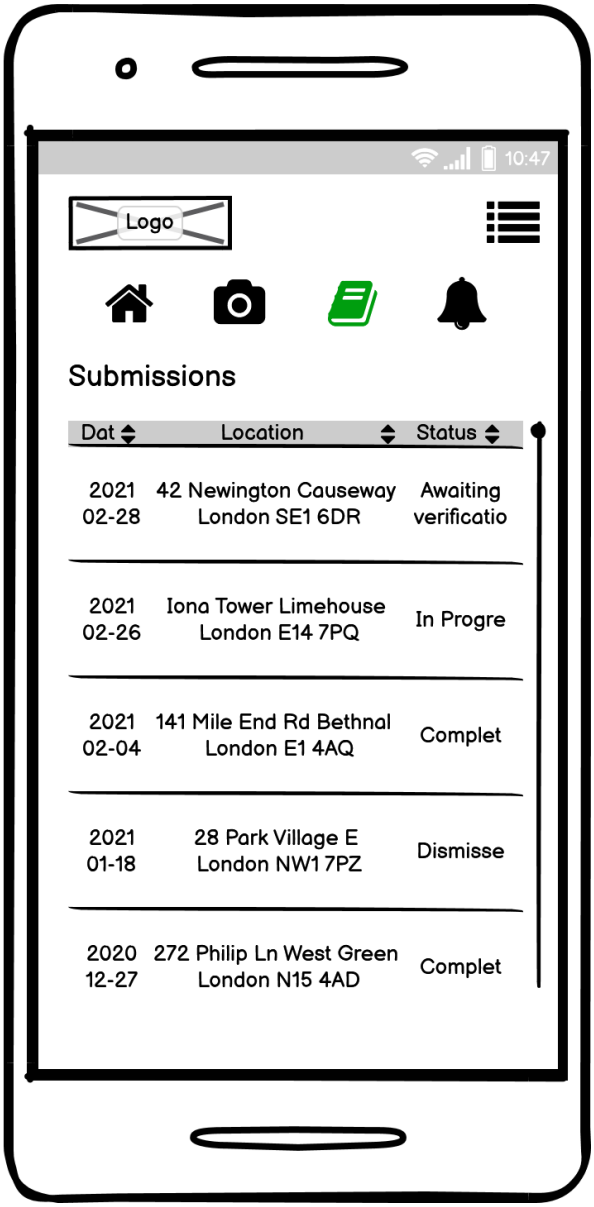
Logo
Username
Password
Login
Forgot password
Create account
10:47
Logo
Home
News


10:47
Logo
Report Litter Sighting
Upload Photos
Description
10:47
Logo
Submit



Appendix

Team Contribution Declaration form

Name	Student code	List of contributions	Contribution %
Abdelhakim Ouchbouk	B00794491	**Risk assessment** **Wireframes**	25%
Bibek Thapa	B00792128	Risk assessment Wireframes	10%
David Fodor	B00796884	**Requirements engineering** **Risk assessment** **Use cases** **Wireframes**	37%
Pami Karki	B00796002	**Requirements engineering** Risk assessment Wireframes	28%