

The Link

Capstone Final Project

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Functional Requirements Document

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1. INTRODUCTION

The Link is a Progressive Web Application(PWA) that allows citizens to easily report problems to the City of Regina without having to guess which method is the best way to reach out to the City. *The Link* also allows the City of Regina to easily manage and deal with citizen's requests in an organized and streamlined fashion.

1.1 Purpose

This functional requirements document outlines the functional requirements of *The Link* PWA developed by Team BEEJ for the fourth-year engineering project. This PWA will be utilized by citizens wanting to report a problem in their area and by the City of Regina employees to view and approve reports. This document will include a scope overview, background information, the methodology and practices employed for this project.

1.2 Scope

This functional requirements document outlines the documentation for *The Link* PWA developed Team BEEJ for the fourth-year engineering project. This document will outline the background on The Link, any constraints or assumptions taken into account by Team BEEJ in the development process of this project. This document will also contain the user requirements and any data flow diagrams and logical models. Furthermore, this document will also outline the security and privacy measures taken by Team BEEJ. This document will finish with the testing results, validation rules, and any other important standards or conventions.

1.3 Background

While brainstorming ideas for our project we realized that there were currently three known methods to report a problem in your city. The first is to simply call into the City of Regina contact center, the second is by filling out a form on the City of Regina website, and the third method is to contact the City of Regina through their social media accounts. Here are the problems that we identified with the current methods; the call center can get very busy at times and lead to long wait times. The form on the City of Regina requires some searching to be found and can be tedious to fill out. Not everyone has social media or would think of it as an appropriate way to report a problem. Also, the city's activity on their social media accounts can vary significantly and can lead to reports being unread and unrecorded. Furthermore, there is no way for other citizens to keep track of the problems that are reported and receive updates. Based on this information, we identified the following problems. Currently, there is not one streamlined way for the civilians to get hold of the ministries to report a problem. So, we want to design a progressive web app that will be the one-stop-shop for civilians to report problems and for ministries to view and act upon them.

1.4 Assumptions and Constraints

The major assumption is the citizens will prefer to use mobile devices and the admins prefer working on personal computers/laptops. Another major constraint for this project was the time limit given, which meant all work had to be completed and submitted by April 10th, 2021.

1.4.1 Assumptions

The assumptions for this project will include all assumptions made regarding the user's ability to operate technological devices such as computers, smartphones, and tablets. Users are also expected to have basic knowledge of applications requiring button and swipe commands. Another assumption is that the admin's would prefer to use the application on a desktop and the citizens would use a mobile phone.

1.4.2 Constraints

Take into account the build of every page on both mobile and desktop. This project must be completed by Project Day which is April 10th, 2021. This project must also be designed while keeping in mind individuals of all age groups and technical abilities.

1.5 Document Overview

This document will outline the start-up and developmental process of *The Link* PWA. This PWA has been created to aid citizens and the City of Regina to have a streamlined mode of communication. Citizens are able to report a problem in their area by uploading an image and short description of the problem. In the same application, the City of Regina employees are able to view, approve and provide updates on the status of reports. This application is built with keeping all screen sizes in mind, from mobile phones to computer desktops.

2. METHODOLOGY

For our project, we used the Agile development cycle. We split up work into two-week scrums for app development and documentation. At the end of each scrum, we would have meetings with Professor Macaig to give an update on our current progress as well as get feedback on the progress made.

3. FUNCTIONAL REQUIREMENTS

3.1 User Requirements

Our project has two stakeholders: the citizens and the admins. Therefore, our user requirements are separated based on the stakeholder. Although, there are other requirements that apply to both of them.

Every user will be able to create an account on the authentication screen of the web app. The sign-up process requires users to submit their username, as well as an email and password which is used to sign in to the app. Users are also able to reset and recover their password in case they forget or would like to change it. Administrators are able to go to the admin homepage (through an authorization code) where they can view and change the status of submitted reports.

User requirements for Citizens:

- As a citizen, I wish the report form could be found easier.
- As a citizen, I would like to take a picture of my report, describe and submit it.
- As a citizen, I would like to keep track of the status of my report.
- As a citizen, if my report cannot be worked on, I would like to know why.

- As a citizen, I would like to be aware of reports that were submitted by other citizens.
- As a citizen, I would like my location to be precise when I submit my report so that it will be worked on as soon as possible.
- As a citizen, I would like to see reports that were submitted by citizens around my location.

User requirements for Administrators:

- As an admin, I would like the ability to delete reports that are spam or not severe enough.
- As an admin, I would like the ability to delete a report that is submitted multiple times.
- As an admin, I would like to let the owner of a report know why the report cannot be worked on / has to be resubmitted.

3.2 Functional Requirements

The Link Progressive Web Application can be accessed by two main user accounts, the citizens and the City of Regina employees. The primary functions of *The Link* PWA are to allow citizens to report a problem and for the City of Regina to view and act on reports in the most streamlined way possible.

3.2.1 Functional Requirements - Citizen Account

A citizen account is able to create an account and log in to the application. Once logged in, the citizen is able to submit a report and view the status of their submitted reports. Once a report is submitted, it is sent to the admin homepage to be approved.

3.2.2 Functional Requirements - Admin Account

An admin can log in with previously created credentials and view all submitted reports on the Admin Homepage. After that, they can either approve or decline reports based on the legitimacy of the post. If deemed illegitimate, admins will be able to provide feedback on why the post was declined.

4. OTHER REQUIREMENTS

4.1 Interface Requirements

This application will be used by the citizens and the City of Regina employees. The PWA user interface is designed with popular social media sites in mind, in order for the layout to be intuitive to users. A user, whether they are an admin or citizen user, will be able to scroll to see all the posts posted on the page. The pages with not too much information.

4.2 Hardware/Software Requirements

The application is developed to work on any platform and device, as long as there is access to the web. The user can access this application on an iOS or Android platform, by accessing the web and saving the application to their home screen. It can

also be used with a desktop, which will also have access to the internet, and can be downloaded on a laptop or desktop computer.

4.3 Operational Requirements

The Link is required to have an uptime of 99.9%. As a result of it being an online application, it is expected to receive reports that are made at any given time and location, as long as it is connected to the internet. Other requirements are:

- The system should allow account creation at any given time, as long as it is connected to the internet.
- This application is required to allow users to log in at any given time.
- This application is required to update the admins on all new reports that have been made.

4.3.1 Security and Privacy

A. The following are consequences of the following breaches of security and privacy.

1. The loss or corruption of user data

- Any loss or corruption of user data would lead to reports not being submitted properly, and also make it unable for admin's to see and complete requests.

2. Disclosure of sensitive information

- This PWA does not contain any sensitive information about its users. It only requires a username, email, and password. Thus, in a

breach of security, only a user's email has the potential to be stolen.

3. Corruption of the software by malware can lead to a potential breach of information described above.

B. State the type of security required

1. Access by user role and type

- It is required that every user has a unique email address to access the app. Both types of users, citizens and admin are able to create an account themselves through the same sign-up form.

2. Access requirements based on system function

- Only admin users have the ability to view and approve submitted reports. The admin users can enter the admin side of the PWA through an authorization code unique to the City of Regina employees.

4.3.2 Reliability

1. State the damage that can result from the failure of this system, and indicate the criticality of the software, such as:

- a. Loss of revenue: In the event of a system failure, there will be no financial impact on both type of users, as there are no transactions been done on the application

- b. Loss of human life: A system failure will not put the life of any user in harm's way.
 - c. Loss of employee productivity: An implication of total system failure for employees at the City of Regina, would be the lack of productivity, as there will be no access to reports that need attention.
2. The minimum acceptable reliability of this application, as with any other online application, is 99%, as it will ensure that the system can receive reports at any given time.

Our application is as reliable as Firebase, as our data is hosted on there.

Firebase guarantees a monthly uptime percentage of at least 99.95%.

4.3.3 Recoverability

- A. In the event that the application is unavailable to the users as a result of a system failure, the application must be restored within 20 to 30 minutes of the system failure to ensure reports are made and are attended to by the admins.
- B. If the processing site(hardware, data, onsite backup) crashes, how soon can the application be restored? The likelihood of our processing site being destroyed is very low as our data is stored using Firebase and it creates backups of data.

4.3.4 System Availability

The application will accept reports 24 hours a day, seven days a week. This is due to the application being online which allows users to submit reports anytime.

4.3.5 Capacity

Firebase's Cloud firestore assures automatic scaling and can handle 1 million concurrent connections and 10,000 writes/second. Storage for content (images) is free up to 10 GB, except on the blaze plan (pay as you go). Below are the firebase authentication limits:

New Account Creation: 100 accounts/ IP address/ hour

Account Deletion: 10 accounts/second

Number of User Accounts possible: 100 million

Email limits:

Operation	Spark (free) plan limit	Blaze (pay as you go) plan limit
Password reset emails	150 emails/day	10,000 emails/day
Email link sign-in emails	2000 emails/day	25,000 emails/day

Email link generation limits:

Operation	Spark plan limit	Blaze plan limit
Password reset links	1500 emails/day	100,000 emails/day
Sign-in links	20,000 emails/day	250,000 emails/day

API limits:

Operation	Limit
Operations per service account	500 requests/second
Operations per project	1000 requests/second, 10 million requests/day

4.3.6 Data Retention

Users are able to delete or disable their accounts from the application at any time. This can be done by contacting an admin at the City of Regina. In the case where an account has been dormant for 14 months, all the data for that account will be removed using an admin account.

All report information will be stored in the database for a duration of 14 months after which it will be removed from the application's database.

4.3.7 Error Handling

Error messages are displayed as alerts in the application in case of incorrect user input such as incorrect login information, incorrect authorization code, and fields left blank.

4.3.8 Validation Rules

- User authentication is done by firebase. In order to create an account, a user must enter a valid email address in the form example@example.abc. The password requirements are below:
 - a minimum of 6 characters required
 - a-z allowed
 - A-Z allowed
 - 0-9 allowed
 - special characters allowed ~`!@#\$%^&*()-_+=|}][["";?/>.<.,
 - white spaces allowed
- A user cannot sign up with an email address that has been used to create an account previously
- In order to sign in to the web app, users must enter an email and password combination that is registered in firebase
- In order to begin using the web app, users must verify their email by clicking the verification link that would be sent to the email they signed up with.
- In order to submit a report, users must provide a brief description, an image, and a valid location (can be generated on the app if the user permits) of the report

- To go to the admin homepage, users must input an authorization code. This code is only available to administrators

5. FUTURE DEVELOPMENT

The application developed for the City of Regina was not requested by the City, however, in an event where the City of Regina is interested in our project, after the deadline of the project, the following will be implemented:

- Push notifications that will alert the users when a report status has been updated.
- Enlarge the scope of our app by including different ministries that handle reports in the province and also branch out to other provinces in Canada.
- Implementing a keyword feature that will be generated when a picture is taken, which will also be matched up to the right ministry or authority.
- Making use of two user pools for each set of users will also be on foresight for future development. Where the ministries or authorities have a separate user pool from the citizen's user pool.