FUNCTIONAL DESIGN

PROJECT HBO-ICT

MAY 29, 2022

FINDYOURWAYIN

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Version control

Version	Date	Modified by	Change
0.1	29/05/2022	Craig	Created project scope, Created Risks, Product overview, Created User platform., Added wireframes.
0.2	09/06/2022	Vedat	Added requirement sources
0.3	10/06/2022	Minh	

Introduction

As the world ventures more profound into a cleaner and more efficient world, there is a need to replace materials that demand paper, such as tourist leaflets, with a digital version. FindYourWayIn is a web application that can do just that by taking the contents of a conventional tourist leaflet and making it digital and readily available for an indefinite number of consumers.

The web application guides the consumer to tourist venues or organisations. It updates what will happen in the area and will benefit both the entrepreneurs and the customers.

This functional design document provides insight into how the web application will appear, what pages are included in the application, and their functionalities. This web application will only be made for mobile devices. The location in focus, for now, is **Walstraat**, **Deventer**.

Project scope and objectives

Problems and solution

Previous studies have shown that the city of Deventer needs digitization to meet the needs of tourists, residents, and the development of small businesses.

To test one of the possible solutions to this problem, a section of the city center of Deventer was chosen (Walstraat). It was decided to create a Web application for smartphones that includes all the features that can help tourists, locals, and local entrepreneurs achieve a common goal, digitize current offerings, make them visible to attract more tourists to the city center, make a life for locals easier and help new entrepreneurs.

Goal

In 6 weeks, our team goal is to build a web application that behaves like the conventional tourist leaflet but digital. It is meant to guide all users who visit Walstraat as this is the application's first testing and deployment site. The web application must support navigation and event updates in Walstraat.

To achieve the main goal of the project, it was divided into several periods in which specific goals had to be completed:

- Until May 29, 2022, A tourist or a local resident may be able to see the latest data on offers (special promotions from companies) on Walstraat and make a route till it. To achieve this, an application must be created which should provide the ability to build a route from the user's current location to a selected point on Walstraat.
- Until June 12, 2022, a tourist or a local resident can get the opportunity to see his favorite routes and plans for visiting different places on the Street on different days or at different times (plan). To implement it, the Webapp has the ability for the user to register an account and log in to his personal account, where all his personal preferences and agenda are stored. Thus, during this period, the application must include the function of registering, logging into an account and keeping a history of user actions.
- Until June 26, 2022, a tourist or a local resident can build complex routes allowing him to optimally visit all the points he has chosen on the map. To achieve this, our application must allow creating the best route between several points on the map.

Product

The project will deliver a fully functional FindYourWayIn web application. This web application will be on a deployed domain (https://hbo-ict-fywi.vercel.app).

Other deliverables to the client will be:

- **Functional design**
- System design
- Instruction manual
- Access to the remote repository
- Analysis and Advice document

Stakeholders

In this section, all the project stakeholders will be listed with a brief description of their role and influence on this project.

- **Client** - Nils, our client, is the person who has a vision of the project and who makes all decisions regarding the product's form and idea. He is the contact point if we have doubts or questions regarding the app's core functionality or other vital topics.
- **Technical Partner** - client's partner, Arne, the person who made software for the customer before and who will assist us during the development. We will contact Arne in case of technical issues or questions about architecture or API.
- **SSS students** – a team of Smart Solutions Semester students, have worked on shaping the original idea into a more specific design with wireframes and documentation; they

will assist us in developing and testing the iterations of the product providing us with feedback. We will discuss visual design, functionality and user experience-related questions with the SSS team, also involving Nils in the discussion when necessary.

- **Developers**, we are the ones who will work on enhancing existing design, implementing new software, and connecting it to the database provided by the Technical partner.
- **Walstraat shops & local entrepreneurs** - as the client said, some organizations and entrepreneurs agreed to be a part of the testing environment. We can use the information about their facilities and depict it in our web app.

Product overview

The wireframes shown below will be according to all the web pages in the application. Each web page's functionality is briefly explained.

Wireframes

The following wireframes are basic designs of the actual product. They might have a slight difference compared to the real product, but we will try to make the application UI matches to the design as much as possible.

Landing Page

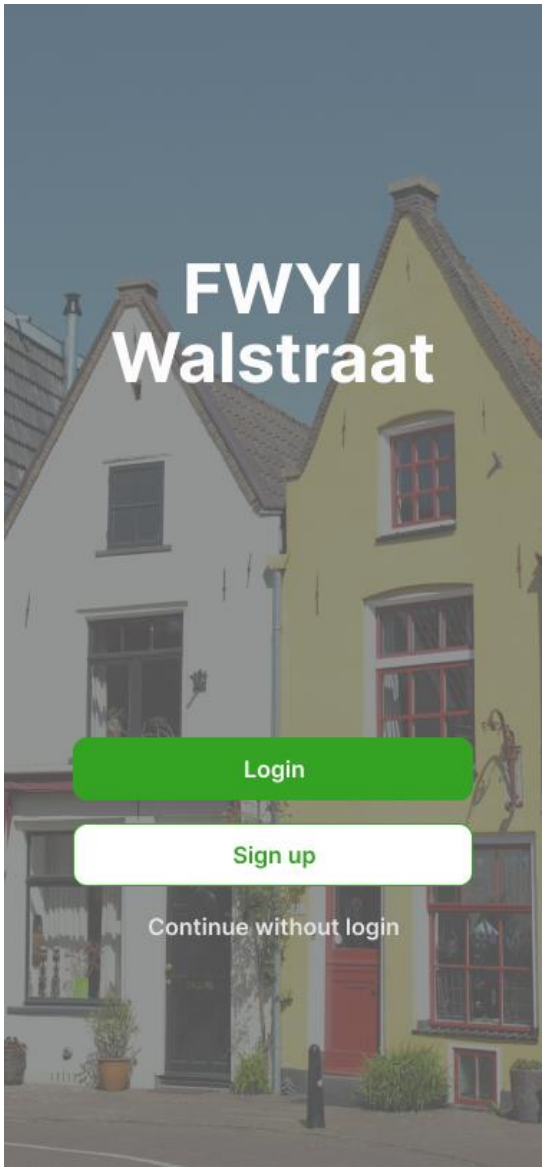

Figure 1: Landing page for FYWI web app

This landing page will appear as the first page upon routing to the home domain page. The user can log in using their existing credentials or create a new account to get new certificates. The user can also reset their account's password if they forget it.

Upon tapping on the "Continue without login" link, they are taken straight to the Map, which is the home page. Tapping on Login is to the login page and sign up to the sign-up page.

Map /Home pages

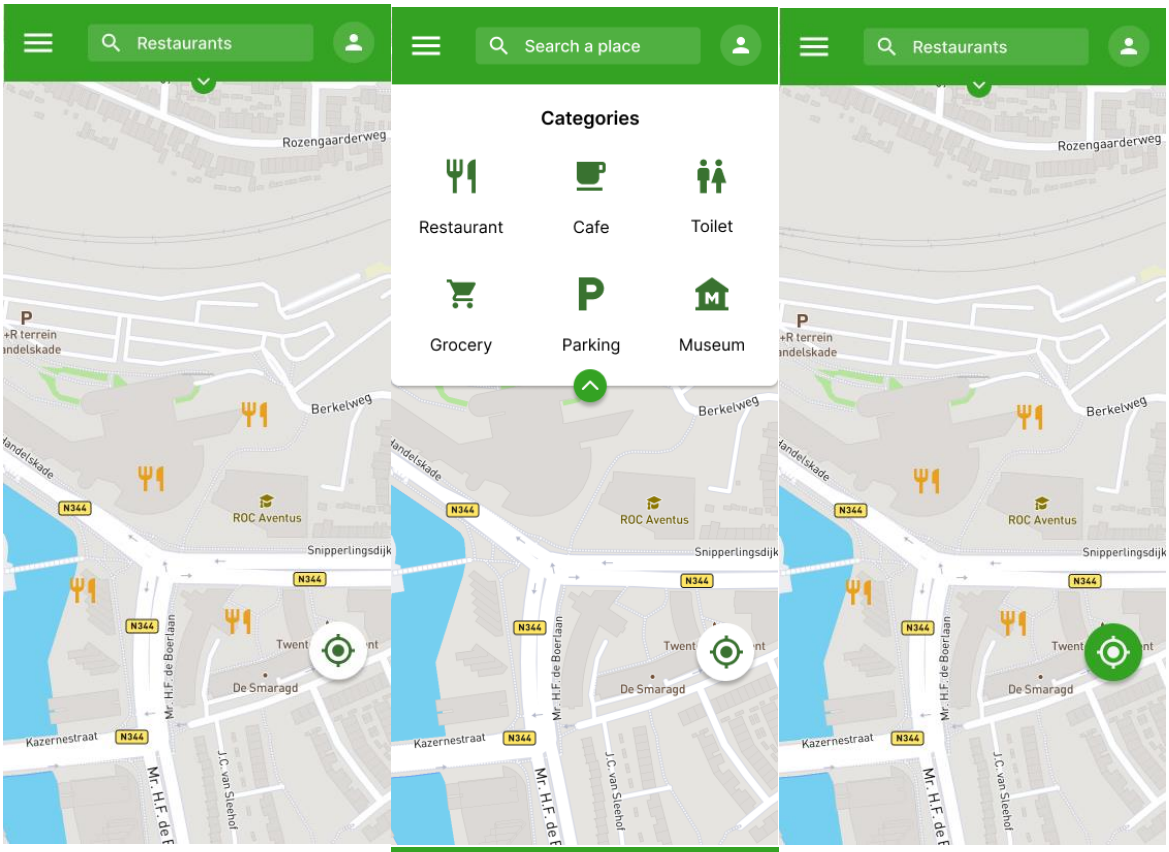
Restaurants
Search a place
Restaurants
Categories
Restaurant
Cafe
Toilet
Grocery
Parking
Museum
Rozengaarderweg
Berkelweg
ROC Aventus
Snipperlingsdijk
N344
Mr. H.F. de Boerlaan
De Smaragd
Kazernestraat
J.C. van Slee
Restaurant A
Restaurant A
Address (Distance)
Route
Info

Figure 2: Home page showing the map

This is the home page. It has an integrated search bar and a slide-down button that reveals the categories upon tapping it. The recalibration icon button focuses the map pan back to the user's current location.

Location details

Figure 3:Location details page

The location details page shows up when the user clicks on any of the location's icons on the map and then clicks on the "more info" button. This page shows all about the site, including the opening times, the contact details, name, and place description.

Login page

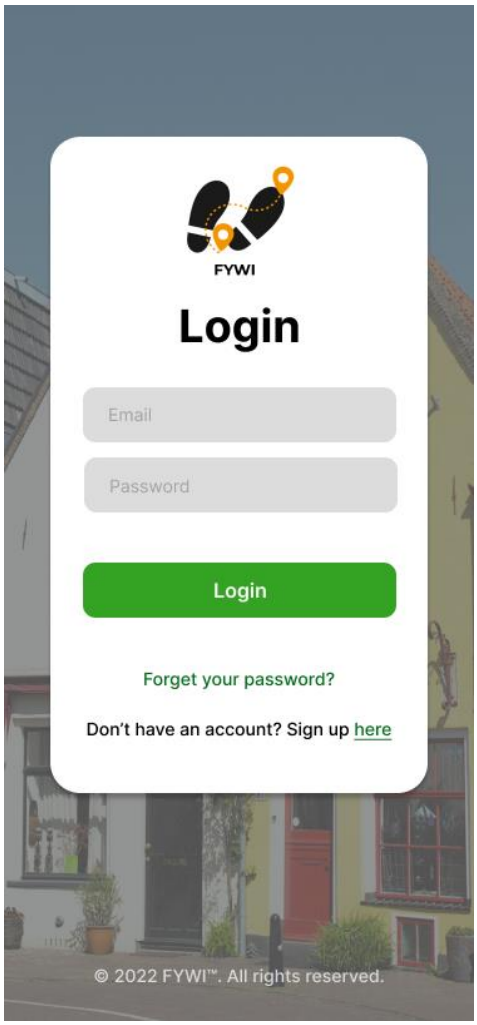

Figure 4. Login page

This is the **Login** page where users can fill in their credentials to authenticate themselves. Users can navigate to the **Sign-up** page by clicking "here" or resetting their password by clicking "Forget your password." If the user wants to go back to the landing page, simply pressing the logo will take the user to the destination.

Sign up page

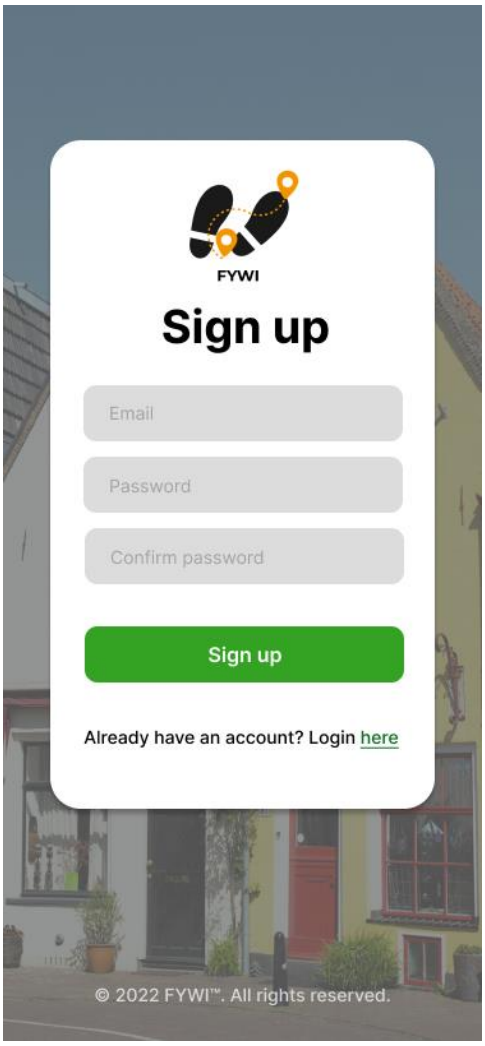

Figure 5. Sign up page

This is the **Signup** page where the users can fill in the required information to register for a new account in the application. After successfully signing up for a new account, the users will be directly logged in to the system and directed to the home page with their credentials. In the incident that the user already had an account, the user can go back to the **Login** page via clicking “here.” Clicking on the logo will bring the user back to the **Landing** page.

Reset password page

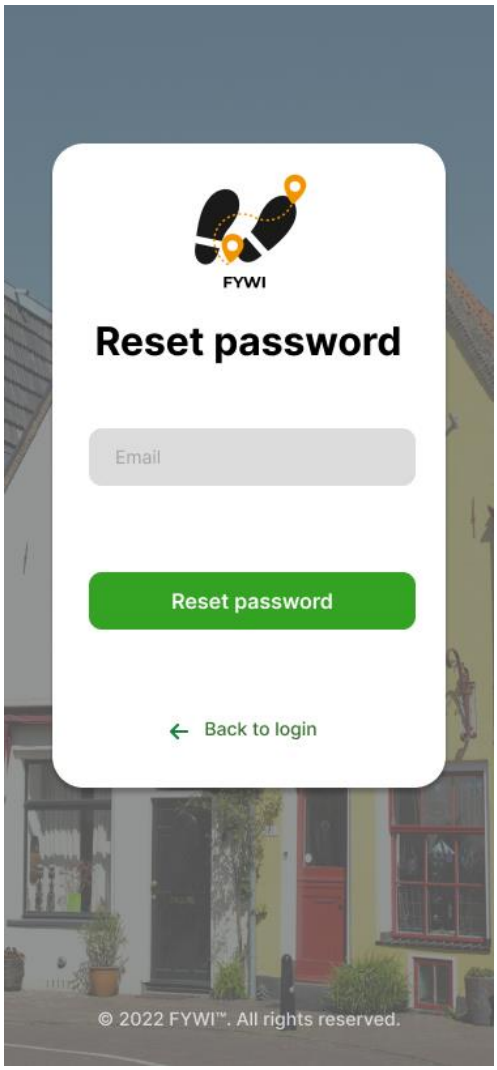

Figure 6. Reset password page

This is the **Reset password** page, where the user can fill in the account's email that its password has been forgotten. A link will be sent to the email that the user can access to set up a new password for that account. There is a "Back to login" link if the user wants to head back to the **Login** page. Clicking on the logo will bring the user back to the **Landing** page.

Diagrams

The following diagrams are continuously added per Sprint.

Use case diagram

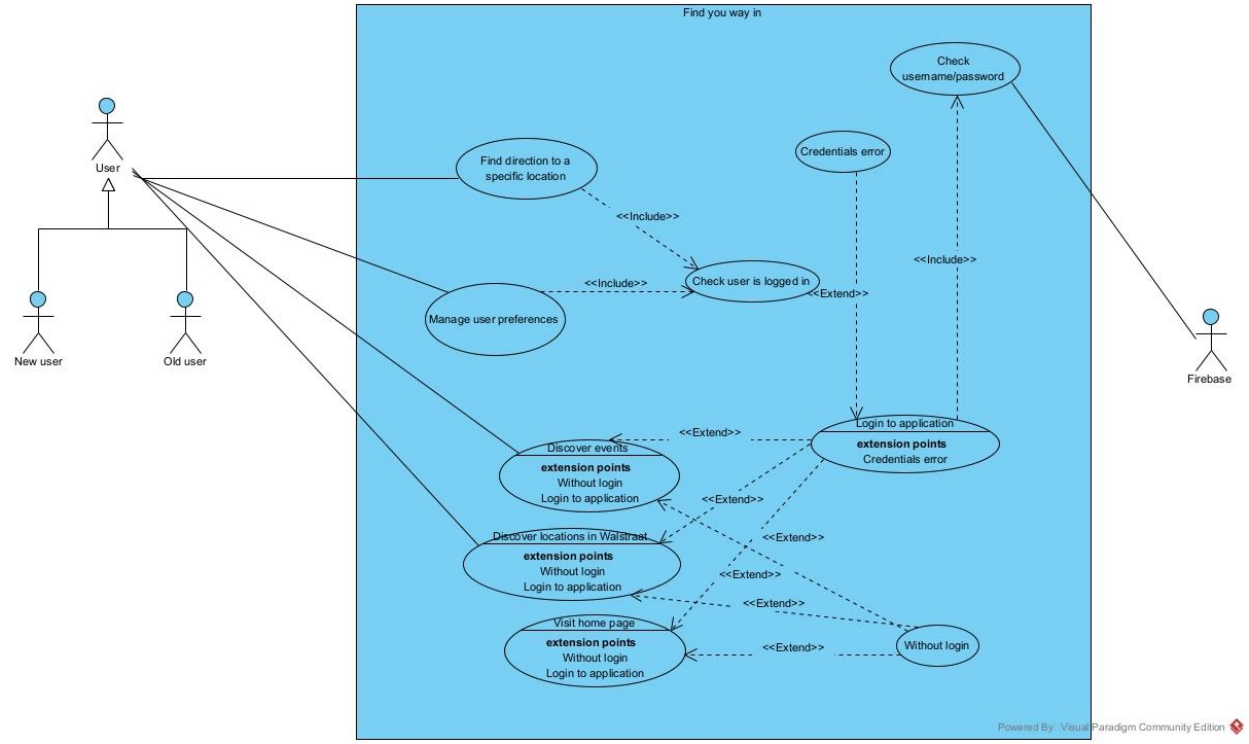

Figure 7. Use case diagram

Risk analysis and advice

The visual and technical design of FindYourWayIn as a web application may be following the digital design protection in Europe as described and argued in an article posted here (Rainer Filitz, 2017) but risks are still to be considered when further developing or deploying the application.

Security risks and advice

Security risks can be considered since user information is being passed on online between the web application and the database. Below is a table that shows the general consequence/ damage of when a specific feature or data is passed on.

General risks

Risk scale	Description	Feature/ Data passed	Risk explanation/ Damage	Risk prevention measure
No / Improbable	When there is no risk that can arise from this issue	-No user details present in the application.	No sensitive data can be stolen.	-

Low	When the risk can easily be dismissible or fixed without extra measures	-User credentials for logging in.	Log in data can possibly be stolen but only to see features in the application such as the users' favourite places. Such data can be used as intel by a dangerous hacker. The users email address might be used to trace to other accounts that exist online.	Encrypt the users' credentials before sending them to database.
Moderate	When the risk can be prevented by using extra preventative measures otherwise damage may be caused.	- User credentials for logging in. - User location is shared.	A hacker can access and know the user's location. Such valuable data can allow them to attack the user at any time since they would know where they would be.	- Encrypt the users' credentials before sending them to database. - Encrypt the users location coordinates for any unwanted viewers. - Use a secure database such as Firebase.
High	The highest level of risk that has a serious consequence if not treated well.	- User credentials for logging in. - User location is shared. - User personal details and bank details are stored in database. - Business owner personal details are stored in database.	A hacker can access their bank details and even confront the user to force them to give away the password when they know where the suer lives. Access to the users' details can cause extremely harmful crimes or actions on future.	- Strictly follow GDPR guidelines and encrypt all the data before sending them to the database for storage. - Use a secure database such as Firebase.

The only valuable data that the web application will be acquiring will be the email address and password for the user. Hence why we are in the LOW-RISK row. It is valuable data in our definition because as agreed in our development team, data that is relative to any user and can be traced back to a specific user is deemed valuable.

Confidentiality

The FYWI web application has a profile page that shows the users personal but basic information such as email address (as their nickname) and a default image given to every user. This information can only be accessed when the user provided their correct credentials when logging in.

For now, we chose to use Firebase (Google, 2022) to manage the login in functionality because it has an in-built encryption algorithm for when the credentials are taken from the application to the database. Data can also be stored securely in the database but only when the developers implement authentication and declarative security rules.

Firebase helped save us a lot of time implementing a real time feature to secure access to the database directly from client-side. An alternative could be to use hypertables in PostgreSQL (TimescaleDocs, 2022) as it is declared one of the most secure databases to handle an attack launched by internet users and hackers. (Preecha Noiumkar, 2016). This can be time consuming to implement but the data will always be kept securely and safe.

Integrity

The user can edit their email address from their profile page. The developers, who have access to the database, can edit their credentials however that is only for development purposes. Therefore, only the user, upon deployment can edit their email address but not the image as it is static for every user for now.

Only the database administrators will be allowed to delete the users' credentials when the user makes a formal request to do so.

Accountability

Each user email address is allocated an ID in the Firebase database as a reference for when the users' favourites are rendered in the favourites page. The favourites page only renders what was marked as a favourite by the user.

Therefore, only the email address with the ID assigned to it can trace back to the owner of the user account. This is a very accurate approach as to use the email address only as the unique key.

Authenticity

For now, there is no feature that can prove that the owner of the account is the one who is claiming so. However, in future, when the application becomes a native mobile application that includes more user details such as their name, selfie, and nationality there will still be no need to prove that the account is theirs because it will only be used to make reviews and comments. Not monetary data will be switched hence further security risks regarding money is irrelevant.

Project schedule risks

FYWI web application was given a schedule lasting only 8 to 9 weeks. This caused some functionalities to be postponed for future development such as the live navigation feature in the native mobile version of the app.

For future developers, judging by the technology stack used to make this web application to this state within this brief period. Future developers can further improve this application within another round of the same space of time and get it done with an improvement.

Therefore, no risks can be associated with this issue.

Operational risks

The running and maintenance of this application can easily be done by a small team with an adequate level of competence. Mainly consisting of a database maintainer and an application maintainer.

Since the project has been built using popularly known technologies such as React and Firebase, the risk of acquiring an incompetent team is exceptionally low.

Technical risks

Since this is a web application the requirements are solemnly a web browser and a mobile device that can connect to the internet. However, the application requires permission to access the mobiles GPS system to access its current location.

Therefore, a risk can be that when the user's device GPS system is having a technical issue then they cannot use the web application to give them a correct route but may instead be shown an incorrect route starting from the devices last known location to the venue they want to visit.

To counter this risk only a native mobile application version must be made as it will automatically be integrated with the existing google maps application already existing in the user's mobile device, giving them an accurate geo location.

Budget and Programmatic

Using google maps api is more expensive than Map box as proved in the research document for the map to use. The client should be able to pay for the monthly fees if they are able to charge the shop owners advertised in this application well enough to compensate for the google map api fees.

Deventer is home to over 80 000 residents and is a small city that is not as popularly known as Rotterdam or Amsterdam. (Raboof, 2022). Hence not too many tourists will be going around within Walstraat per month. This application can also be used by the residents but since they know a lot about Walstraat they may not need the application for routing but mainly for updates on events and promotions and this is completely outside of googles map api scope.

A risk still, can be that during holidays the number of users for the application can reach to a peak figure of at least 35 000 in one month. This can become expensive because after the first 28 000 API calls for the month, a fee of USD210 is handed out for every 1000 API calls extra made per day (Godiyal, 2021). Therefore, the client can easily get overwhelmed by the unexpected sharp rise in monthly fees during the holidays and breaks.

To counter this issue, map box would have been a cheaper API to use as it is free for the first 50 000 API requests and then a cumulative charge of at most USD1 per 1000 requests is issued. (Voroshylov, 2021). This can easily be implemented if only there is extra time to implement the functionalities. Therefore, it is advised, that for the client to acquire a lumpsum of money, they may need to implement map box in the native mobile version of the application.

Appendix

Requirement sources

Most requirements were acquired during the first meeting with the client. In the first meeting, the client explained what they wanted to accomplish with the future product and how they wanted it to be.

"" = 25 April First Client Meeting, TheFeedFactory Company, Walstraat-Deventer*

Business Requirements

Reference ID	Requirement Description	Source Details
Bu01	Business wants the web application to provide the same information a tourist leaflet would	*
Bu01	Business wants the web application to be easily usable in other cities.	*
Bu01	Business wants web application to be used by consumers of any age.	*
Bu01	Business wants web application to help reduce the use of paper travel documents.	*
Bu01	Business wants web application to mainly help tourists and local entrepreneurs.	*

Reference ID	Requirement Description	Source Details
Cu01	The user wants to be able to view the navigation map.	*
Cu02	The user wants to be able to read a description of the destination.	*
Cu03	The user wants to be able to see a list of destinations with promotions and discounts they can visit in Walstraat.	*
Cu03	The user wants to be able to get a route to the selected destination.	*
Cu04	The user wants to be able to see promotions offered by the shop or restaurant.	*
Cu05	The user wants to view the overall agenda of Walstraat with all upcoming events.	*
Cu06	The user wants the web application to let them discover events and locations within Walstraat.	*
Cu07	The user wants to be able to change the language to their preferences.	*
Cu08	The user wants to be able to search for a specific place according to their preferences.	*
Cu09	The user wants to be able to see an organization in the spotlight	May 2, Client & Smart Solutions Students Meeting, Saxion
Cu10	The user wants to be able to get a personalized route based on their preferences.	May 2, Client & Smart Solutions Students Meeting, Saxion
Cu11	The user wants to be able to contact the organization using their contact details.	*

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