End Report

Erasmus+ Gluten project

Date	17 January 2020
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Project	Erasmus+ Gluten project
Minor/thematic semester	Internet of Things

Hogeschool van Amsterdam

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1 Introduction

This document is the end report for MyCoeliac. A product created as part of the Erasmus+ Gluten project. The end report contains the following chapters:

Project description
Short description about the project.

Project organization
Mention of those involved; the development team(s) and stakeholders.

User analysis
An analysis of the target audience and their needs.

Requirements analysis
An analysis of the objectives based on the needs of the target audience.

Requirements
The requirements for reaching the goal(s) of the project.

Product design
The final design of the product.

System overview
A systematic overview of the software system.

2 Project Description

According to research done by students of the health faculty of IT Carlow, it's teenagers who experience the most difficulties adhering to their gluten-free diet. The reason, according to research of the cooperating universities, for this is that teenagers have problems such as an indifferent attitude, ignorance and the fear of social exclusion.

In Europe, 1%-2% of the population suffers from Coeliac disease and the number of people being diagnosed with this affliction is increasing. One of the biggest problems for patients is the required constant compliance to their diet. At present there is no curriculum to educate teenagers about the long-term risks of gluten ingestion.

This project was targeted towards teenagers, within the ages of 12 to 17, who suffer from Coeliac disease. People who are affected by this disease have a gluten-allergy. They should not eat food that contains gluten in order to avoid physical and mental symptoms and risk the possibly fatal consequences. Especially teenagers have a harder time when it comes to sticking to their gluten-free diet because it limits their food choices tremendously, compared to their friends.

3 Project Organization

Since this is an international project, there are multiple universities from different countries that are participating in this project.

The following universities are involved in the development of this project:

- **Amsterdam University of Applied Sciences**
- **Institute of Technology Carlow**
- **Medical University of Seville**
- **University of Applied Sciences Upper Austria**

All the above universities have teams composed of one or more students working on different products. The products that each team is working on is different, but the goal of all the projects is to motivate teenagers with Coeliac disease to adhere to their diet and inform people of Coeliac disease. At certain points in the year an international week will be “organized” at one of the universities, where students from the different universities will show the work that they have done, or to have a deeper understanding of patients with Coeliac disease if the teams are just starting their project.

3.1 Team Organization

Our team consists of four people. Below you will find a table regarding their educational background and the role(s) within the project.

Name	**Field of study**	**Year of study**	**Role**
Jordy Boelhouwer	Software Engineering	4th year	Front-end developer
My Linh Nguyen	Software Engineering	3rd year	Front-end developer Designer
Jeffrey van Riemsdijk	Technical computing	3rd year	Front-end developer
Martijn Vegter	Technical computing	3rd year	Back-end developer DevOps

3.2 Stakeholders

The stakeholders that are involved includes the teachers that are managing this project from their home university and a clinical professor. Below is a table of the stakeholders that we directly have contact with.

Name	**Field of study**	**Origin**
Remco van Swieten	Game Development	The Netherlands
Marieke Agterbos	Game Development	The Netherlands

Dr. Alfonso is a clinical professor at the St. Luke's General Hospital in Ireland. He gives us an insight into Coeliac Disease from a clinical point of view.

Dr. Alfonso Rodriguez-Herrera

4 User Analysis

This paragraph contains our user analysis. This user analysis was mostly done in Ireland, during our international week at IT Carlow. We have used a couple of methods for the user analysis. We interviewed the doctor who specializes in Coeliac disease and is related to our project: Dr Alfonso Rodriguez-Herrera. We have also created Empathy Map(s) based on what we already know about our target audience, which are teens with Coeliac disease.

4.1 Interview with Dr. Alfonso

As part of our user analysis, we held an interview with Dr. Alfonso to get the perspective of a health professional on the issue of teenagers suffering from Coeliac disease and what advice he has for us regarding the solution(s) we want to implement to reach the goal of the project. Below you will find a summary of the information that we have obtained from our interview with Dr. Alfonso.

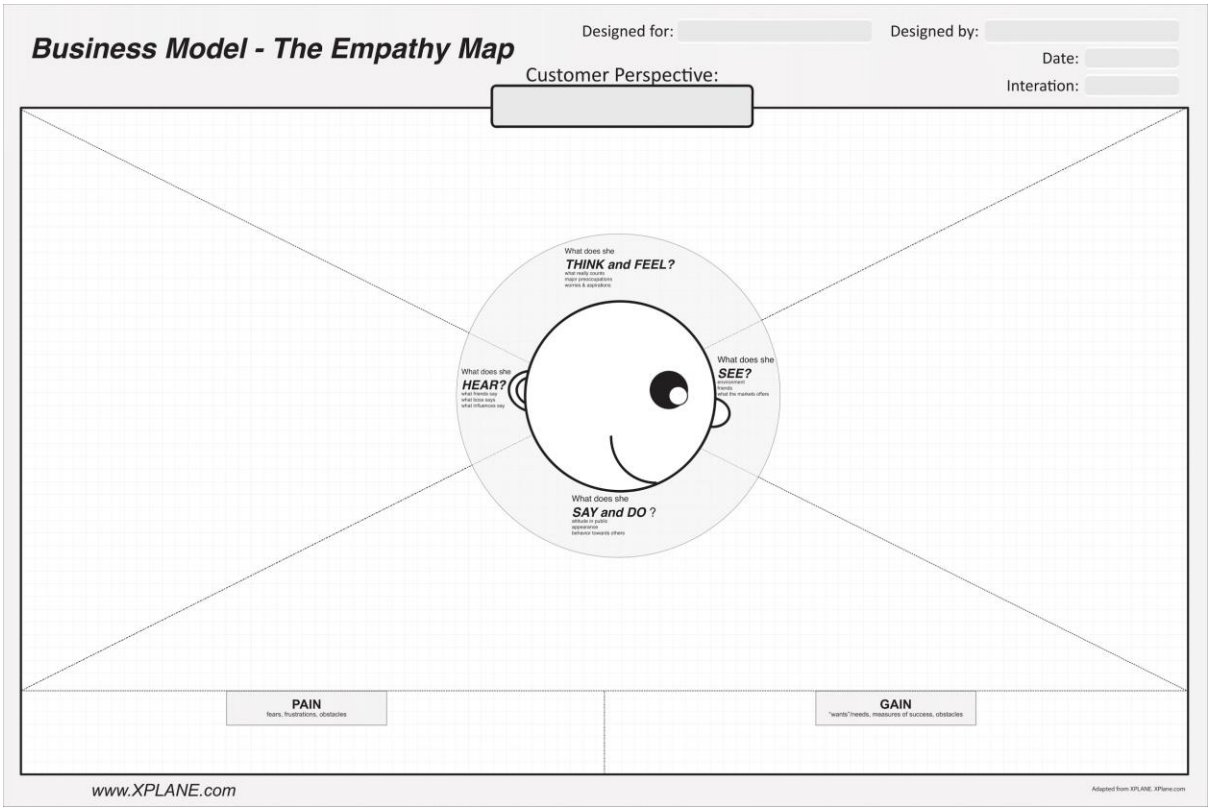
In general, patients diagnosed with Coeliac disease find the most support from their inner circle of friends and/or family depending on their age. Children depend the most on their mother as they are generally involved in meal preparation and can guide the food consumption of their child. Teenagers depend the most on their friends as they feel that their friends can understand them better than his or her parents. In combination with puberty this is the hardest group to give guidance. Adults either depend on their partner or attempt to handle it individually.

One of the issues with making Coeliac disease more bearable, is enabling the patient to discuss their symptoms with their friends and family. Depending on social background of the patient the barrier to talk about this is can be so high that patients decided to no speak about it at all.

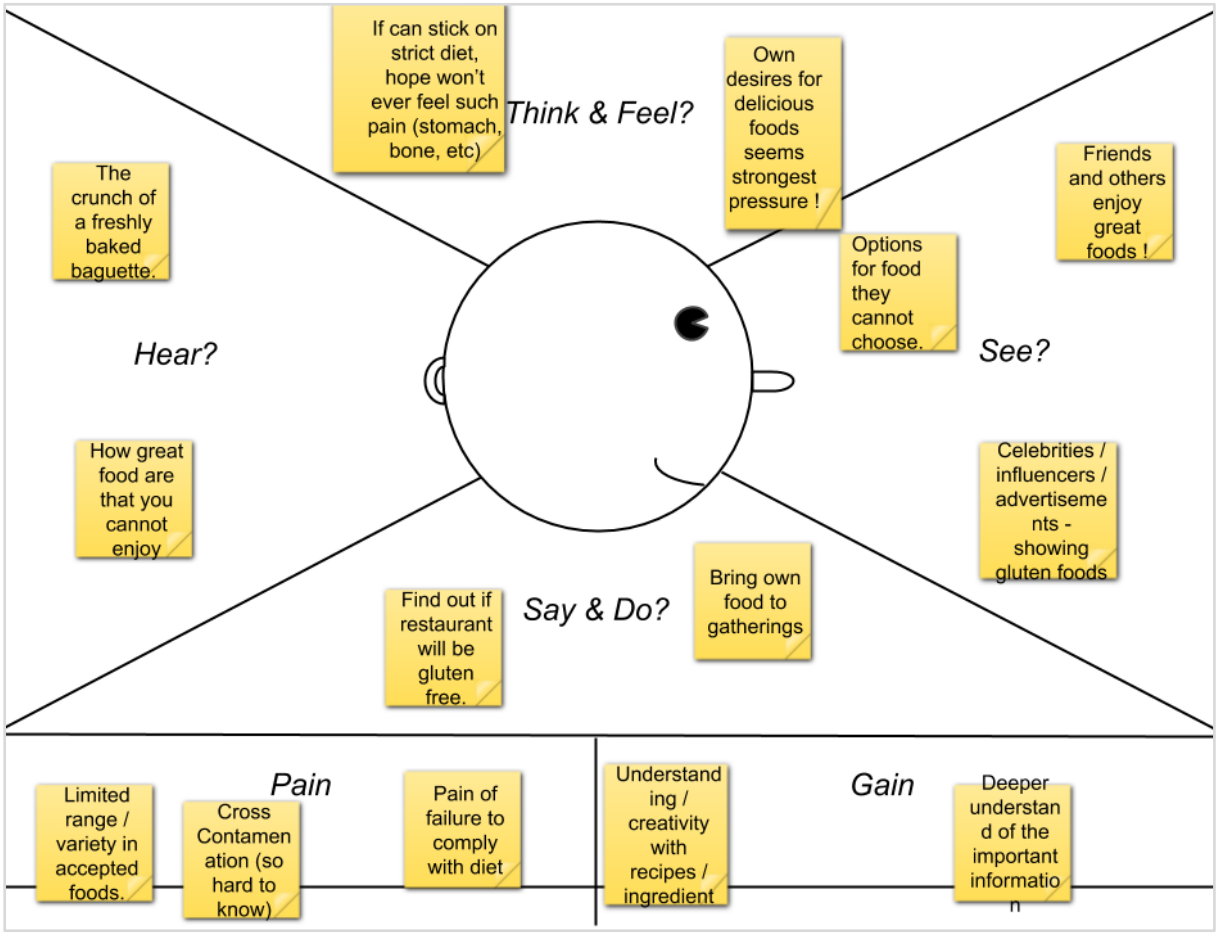
4.2 Empathy Maps

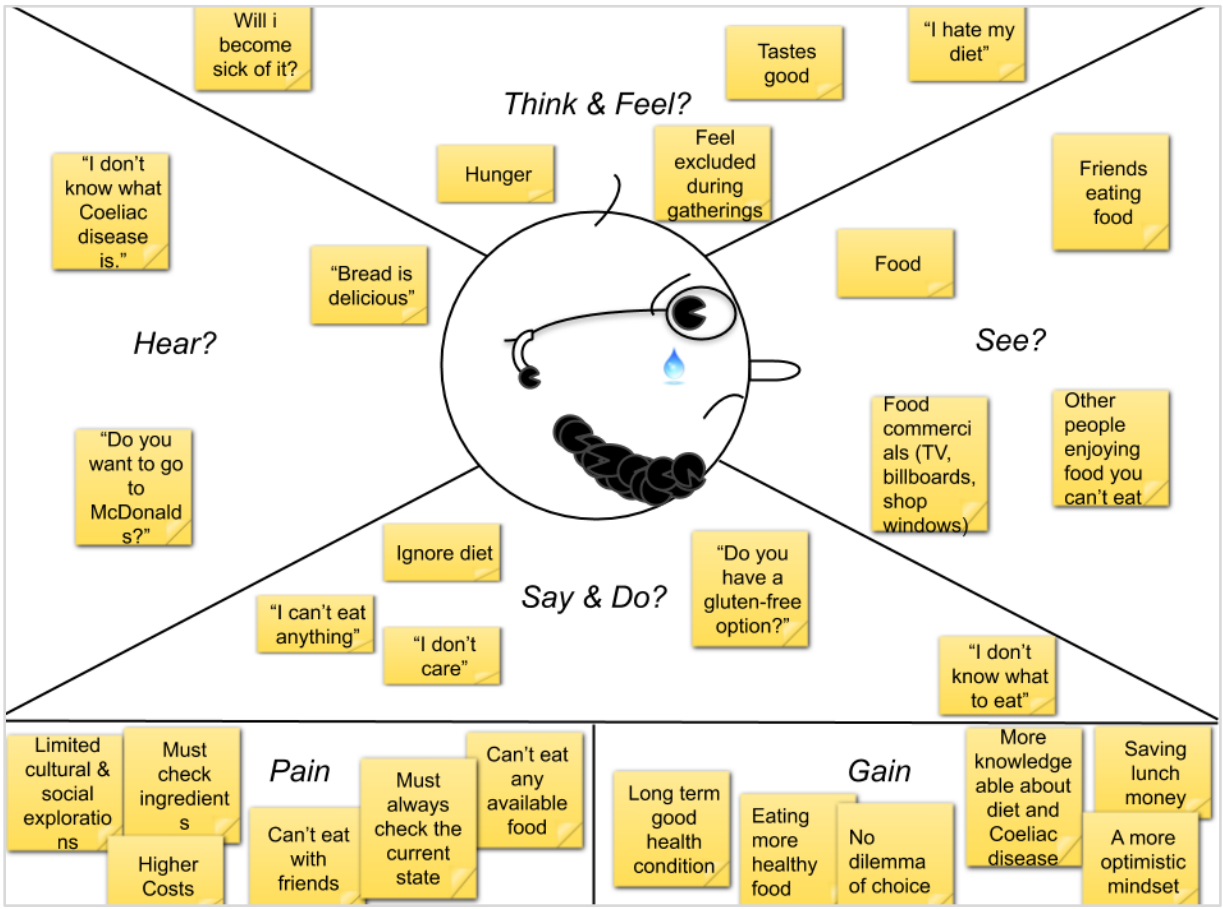
An empathy map is a way to gain a deeper insight into your target audience. It works a bit like a user persona, but the emphasis is on the feelings, senses and emotions of the user.

A base template of an empathy map would look like the image below, note the different sections for the different emotions or senses of the user:



The purpose of an empathy map is to get together with your team and have each member of the team to fill in parts of the empathy map based on what they know of the user. The empathy map is a good way to immerse yourself in the user and gain insights about them, which we planned to use for our requirements analysis. The images below show our filled in empathy maps. We have multiple empathy maps because we were split up in different multicultural groups.


If can stick on strict diet, hope won't ever feel such pain (stomach, bone, etc)
Think & Feel?
Own desires for delicious foods seems strongest pressure !
Friends and others enjoy great foods !
The crunch of a freshly baked baguette.
Options for food they cannot choose.
Hear?
See?
How great food are that you cannot enjoy
Celebrities / influencers / advertisements - showing gluten foods
Find out if restaurant will be gluten free.
Say & Do?
Bring own food to gatherings
Pain
Limited range / variety in accepted foods.
Cross Contamination (so hard to know)
Pain of failure to comply with diet
Gain
Understanding / creativity with recipes / ingredient
Deeper understand of the important information


Will i become sick of it?
Tastes good
"I hate my diet"
Think & Feel?
"I don't know what Coeliac disease is."
Hunger
Feel excluded during gatherings
Friends eating food
Food
"Bread is delicious"
Hear?
See?
"Do you want to go to McDonalds?"
Food commercials (TV, billboards, shop windows)
Other people enjoying food you can't eat
Ignore diet
"Do you have a gluten-free option?"
Say & Do?
"I can't eat anything"
"I don't care"
"I don't know what to eat"
Pain
Limited cultural & social explorations
Must check ingredients
Higher Costs
Can't eat with friends
Must always check the current state
Can't eat any available food
Gain
Long term good health condition
Eating more healthy food
No dilemma of choice
More knowledgeable about diet and Coeliac disease
Saving lunch money
A more optimistic mindset

5 Requirements Analysis

This chapter contains our requirements analysis. During this analysis we used the insights about our target audience that we received during the user analysis and drafted need statements and user stories.

5.1 Questions to ask ourselves

We started with defining some questions for ourselves about our target audience. We asked ourselves how we could solve the most common problems teenagers with Coeliac disease experience. We categorized them in the following three categories:

Capability
How can we give users the capability to resolve a problem?

Motivation
How can we motivate users to resolve their problems?

Opportunity
How can we give users the opportunity to resolve their problems?

For each of these categories we defined a couple of questions.

Capability

- How can we make information about Coeliac disease readily available?
  Summary: Readily available information

- How can we make teenagers with Coeliac disease feel like they are not the only one suffering from the condition?
  Summary: Feel like they are not the only one with the condition

- How do we help teenagers with Coeliac disease distinguish between products when grocery shopping?
  Summary: Product distinction

- What do teenagers with Coeliac disease need to feel like they have a community that is supporting?
  Summary: Supportive community

Motivation

- How can we incentivize patients with Coeliac disease to log their symptoms truthfully?
  Summary: Log symptoms truthfully
- How do we encourage teenagers to keep using the app for a long time?
  Summary: Sustainable application
- How do we make sure teenagers with Coeliac disease do not relapse after a while?
  Summary: No relapse
- How can we help teenagers with Coeliac disease sustain an optimistic mindset?
  Summary: Optimistic mindset
- How can teenagers with Coeliac disease feel encouraged to stick to their diet?
  Summary: Encouraging diet

Opportunity

- How do we recreate the same enjoyment of eating food for teenagers with Coeliac disease?
  Summary: Recreating enjoyment of food
- How do we facilitate a function for teenagers with Coeliac disease to rate or review the products that they have eaten?
  Summary: Product review
- How do we connect famous or influential people with Coeliac disease to influence teenagers with Coeliac disease?
  Summary: Role models

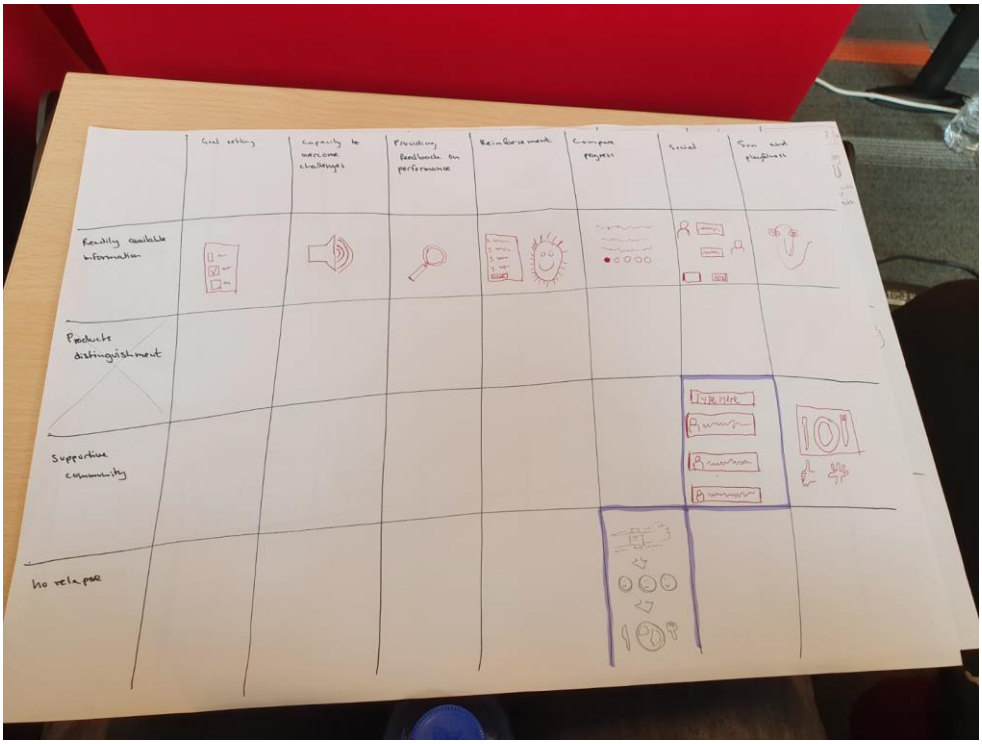
5.2 Need Statements

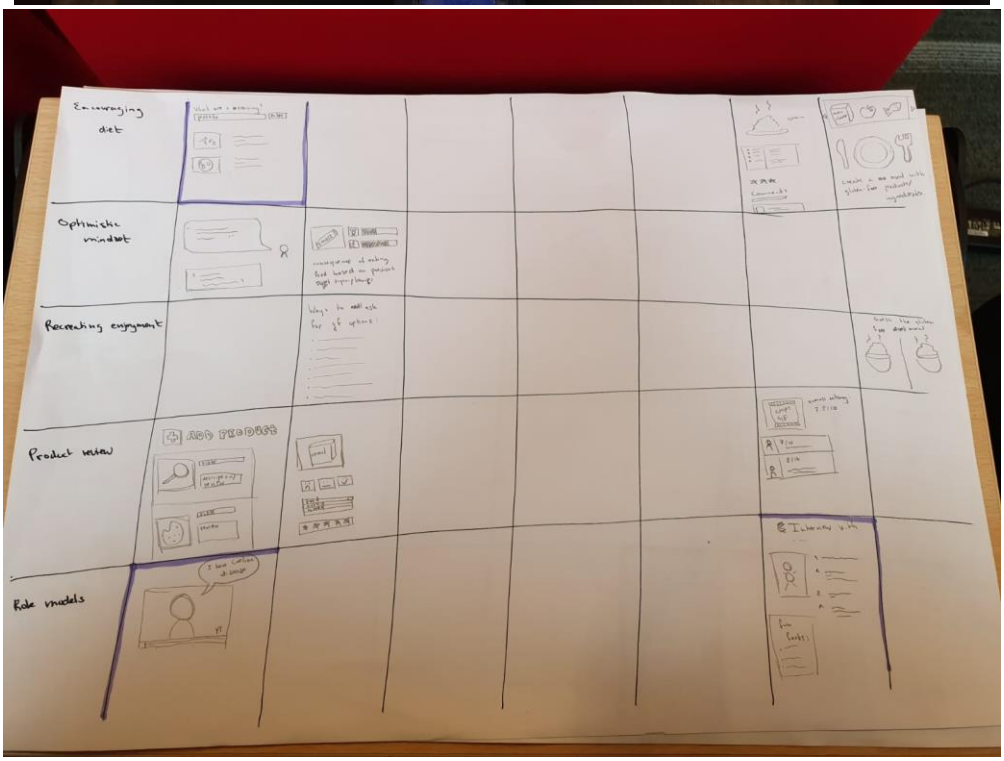
After we defined the above questions, we defined need statements. Need statements outline what a user needs to achieve their goals, before we begin the technical discussions that focus on specific features and functions. Focusing on needs in the early stage before technical features ensures we are not solving the wrong problems with our features. Below here are our need statements:

- I need to know what questions I should ask restaurants regarding my gluten-free meal options, as well as questions to help avoid cross-contamination?
- I need to be able to easily access information about coeliac disease
- I need to be able to distinguish gluten free products in supermarkets from gluten products to find those products faster.
- I want to be able to assign my complaints to eaten product to see what I can really tolerate and what I can't.
- I need a recreation of the experience of enjoying the food my friends eat because I won't be excluded and treated differently
- I need to feel like I am not the only one with my condition, because it gives me confidence and it encourages me to stick to my diet.

5.3 Morphological Chart

Morphological charts are tables that can be used for idea generation. On the y-axis you write down the functions. On the x-axis you draw things that can be used to perform the function. It is used as a visual aid to help generate ideas. Below here you see our morphological charts.





6 Requirements

This chapter contains our requirements for the product, which we based on the insights we got from the requirements analysis from the previous chapter

6.1 User Stories

- As a patient with Coeliac disease I need to feel the same enjoyment as my friends when eating food, because I don't want to be excluded and treated differently.
- As a patient with Coeliac disease I need to feel supported in sticking to a gluten-free diet, because otherwise I will develop serious health issues.
- As a patient with Coeliac disease I need to feel more confident in conveying and sharing my needs to others, because I can broaden my creativity and imagination to fit my diet into my social environment.
- As a patient with Coeliac disease I need to feel like I am not the only one with my condition, because it gives me confidence and it encourages me to stick to my diet.
- As a patient with Coeliac disease I need to feel like resources are readily available, because it'll encourage me to learn more about a gluten-free diet.

7 Product Design

This chapter contains the designs of our product. We have designed the application using Invision and filled in a product and project canvas.

7.1 Product Canvas

A product canvas is used to help build good user experiences. The product canvas contains the following sections:

Name
The name of the product.

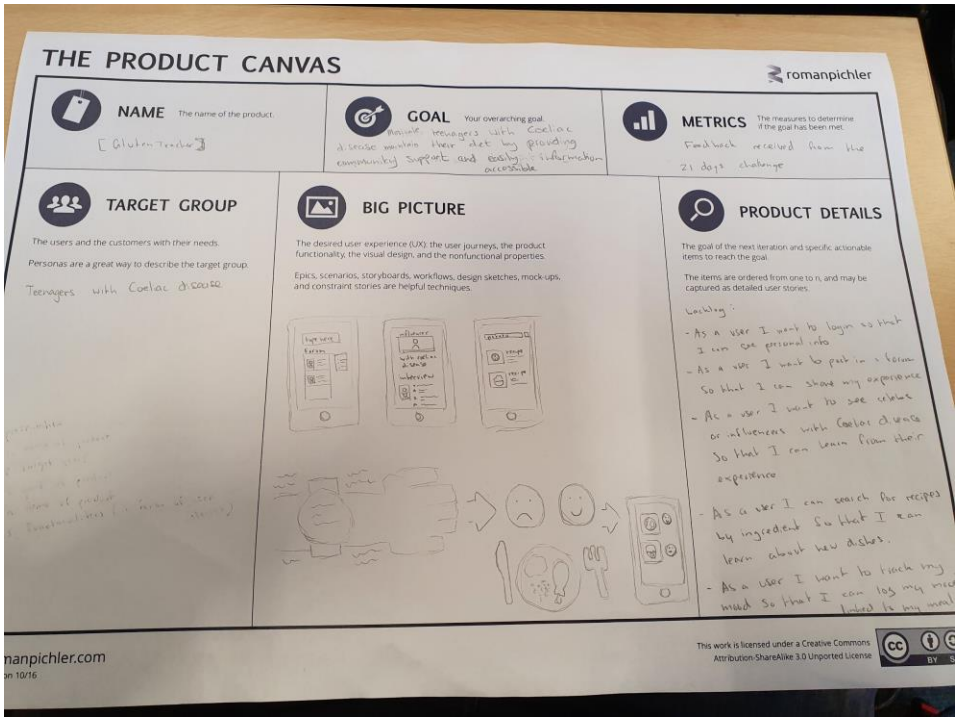
Goal
The objective that should be met.

Metrics
The measure by which to determine if the goal has been met.

Target group
The target customers.

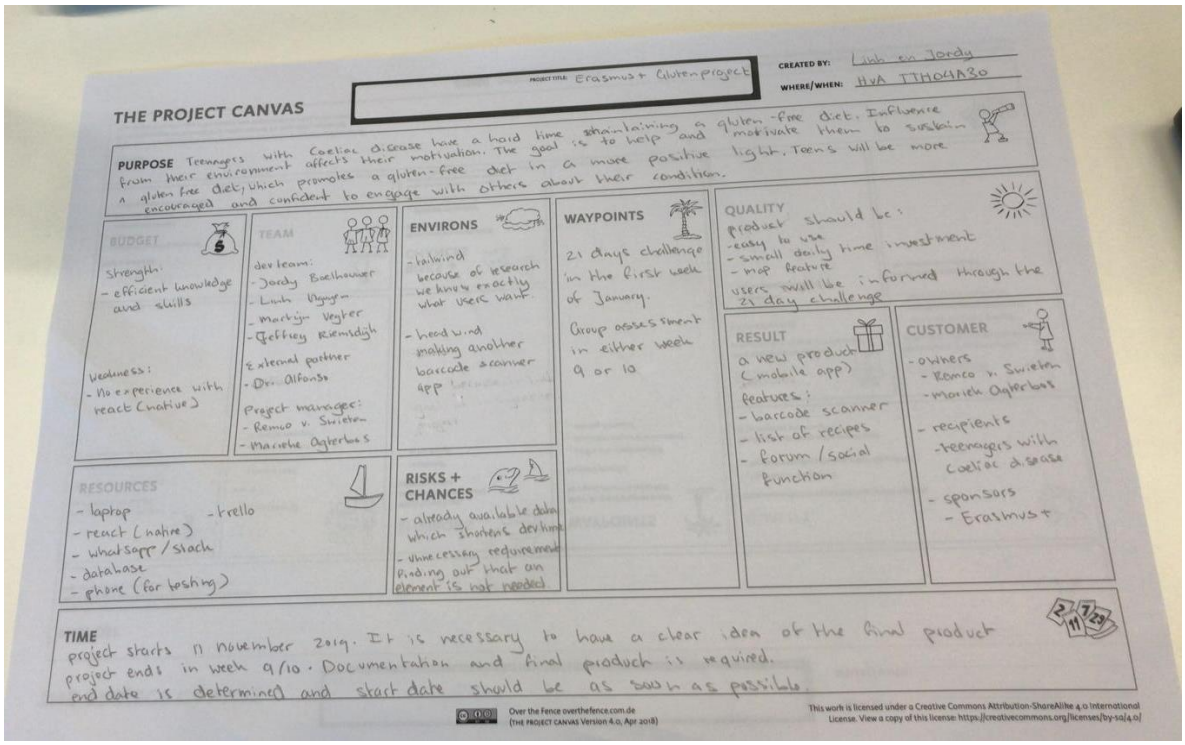
Big picture
Describes what it takes to meet the goals of the user.

Product details
Implementable items to reach the goal.



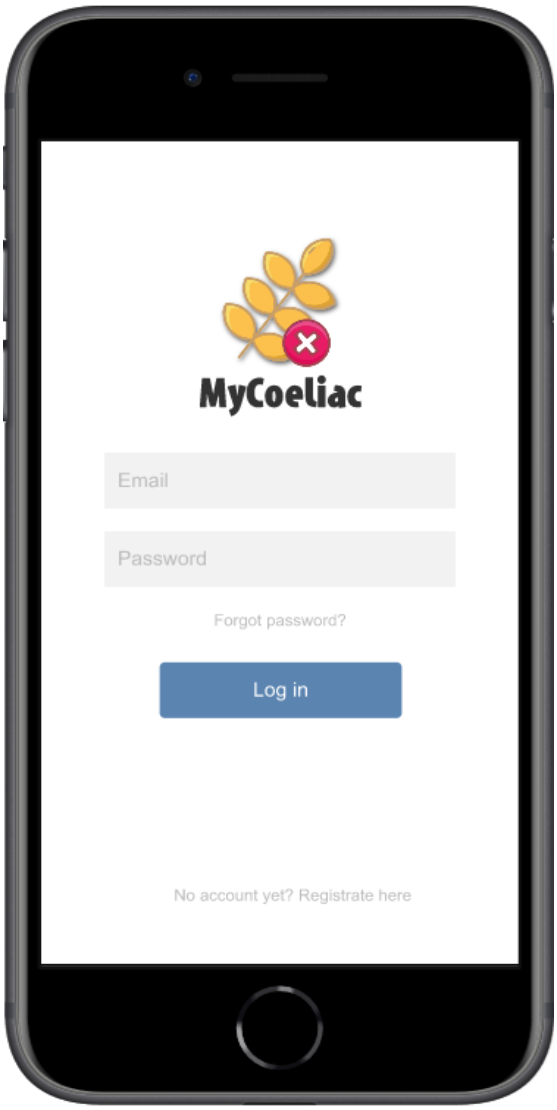
7.2 Project Canvas

A project canvas is a tool to help a team get a complete overview of the project. This is done by filling in 15 different elements of the project canvas. These elements range from budget and time to environment and result. Below here is our filled in project canvas.

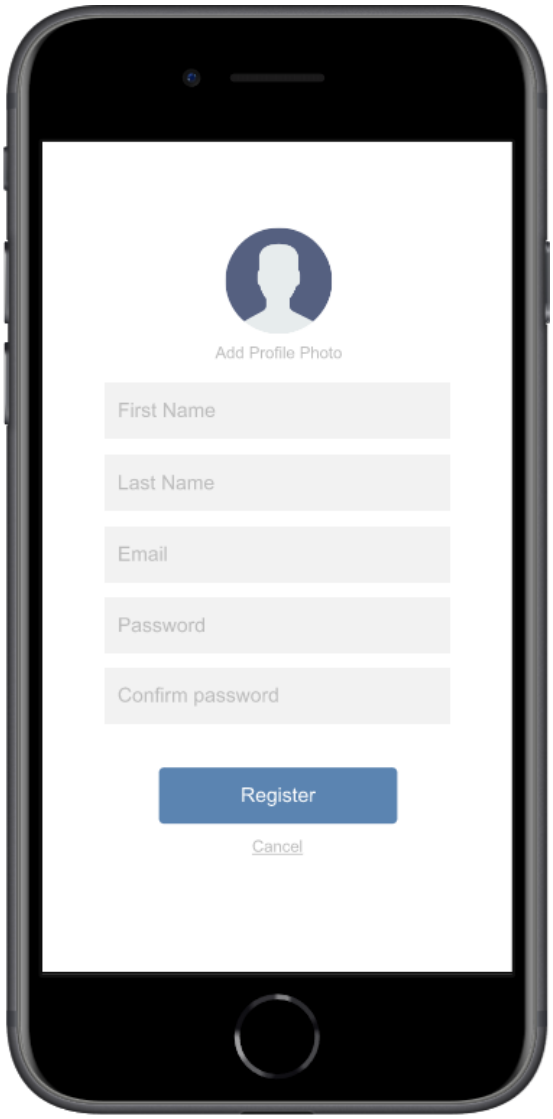


7.3 Prototype

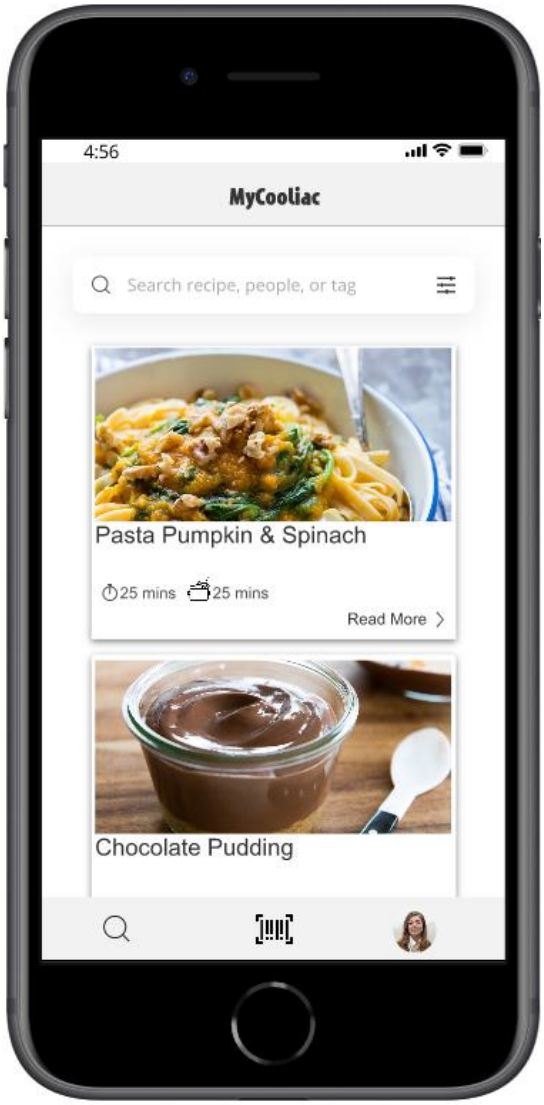
We created designs for the app on Invision. Below here you can see images of our designs.



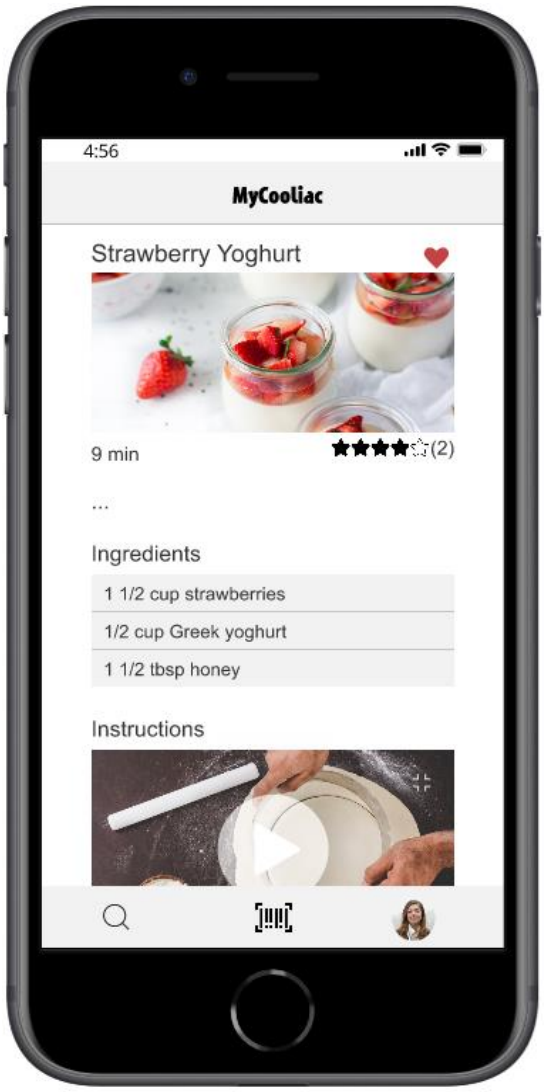
Login page



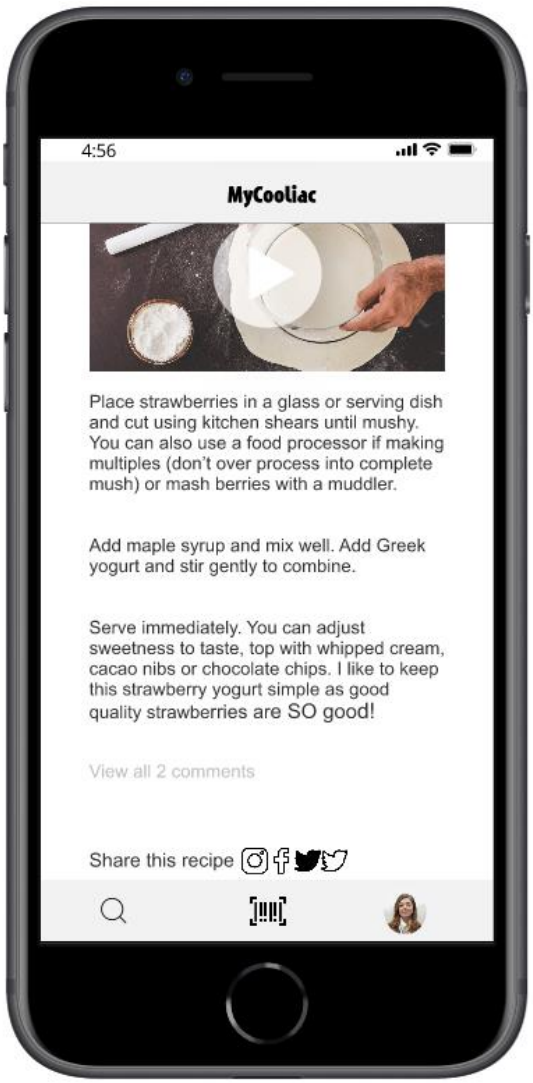
Register page



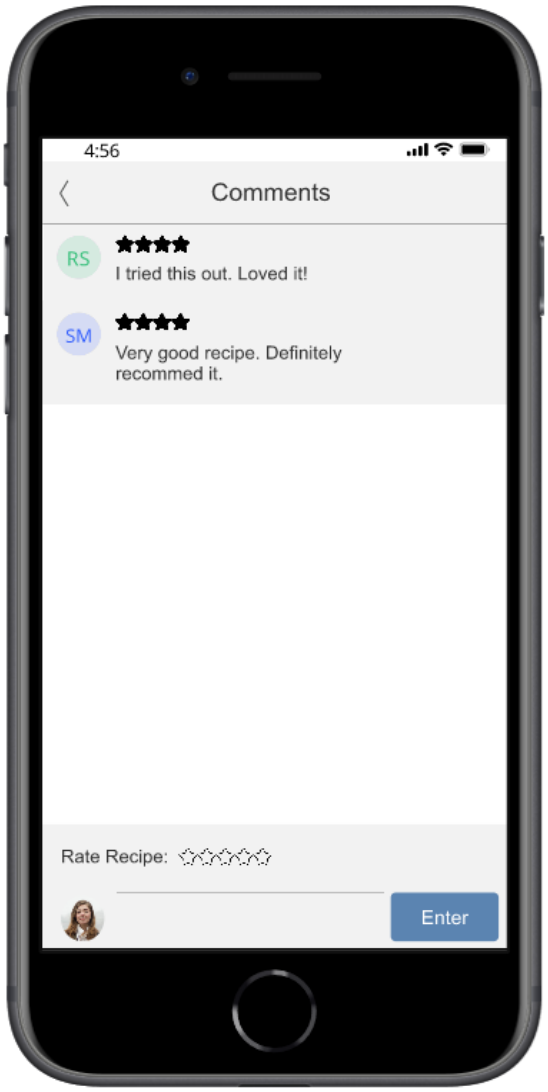
Landing page



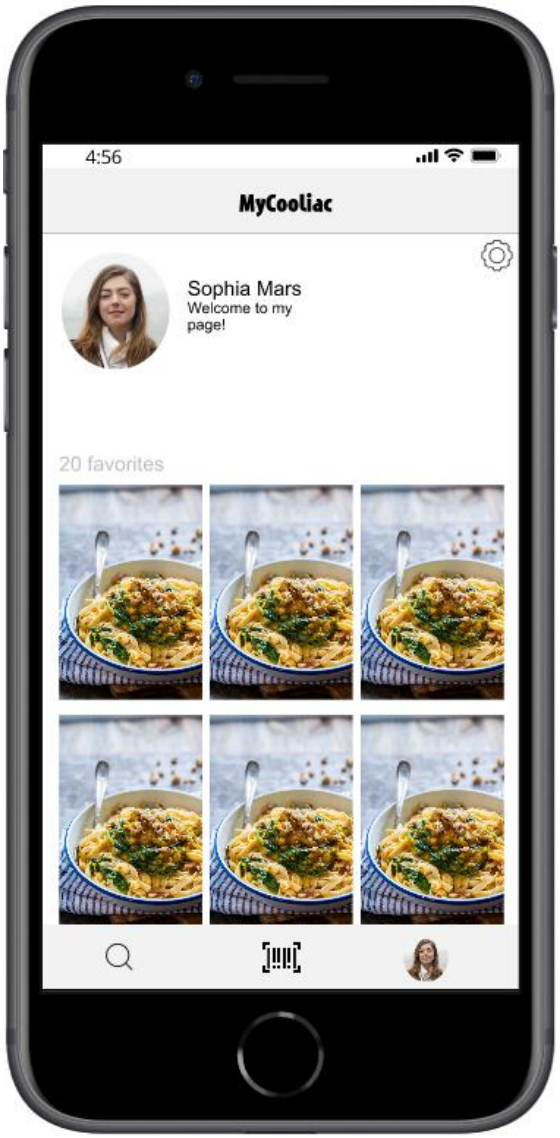
Recipe detail page top



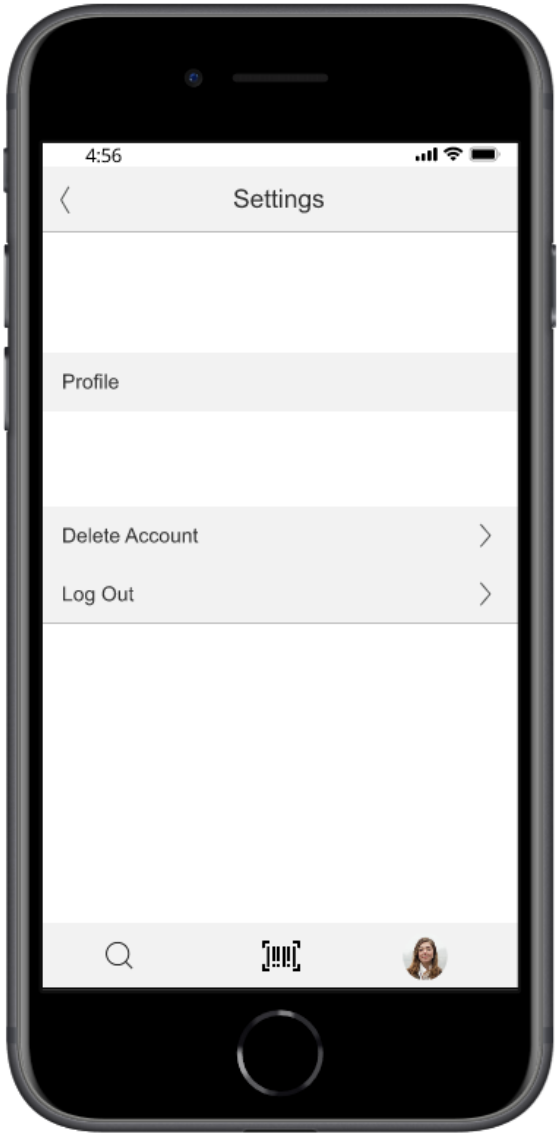
Recipe detail page bottom



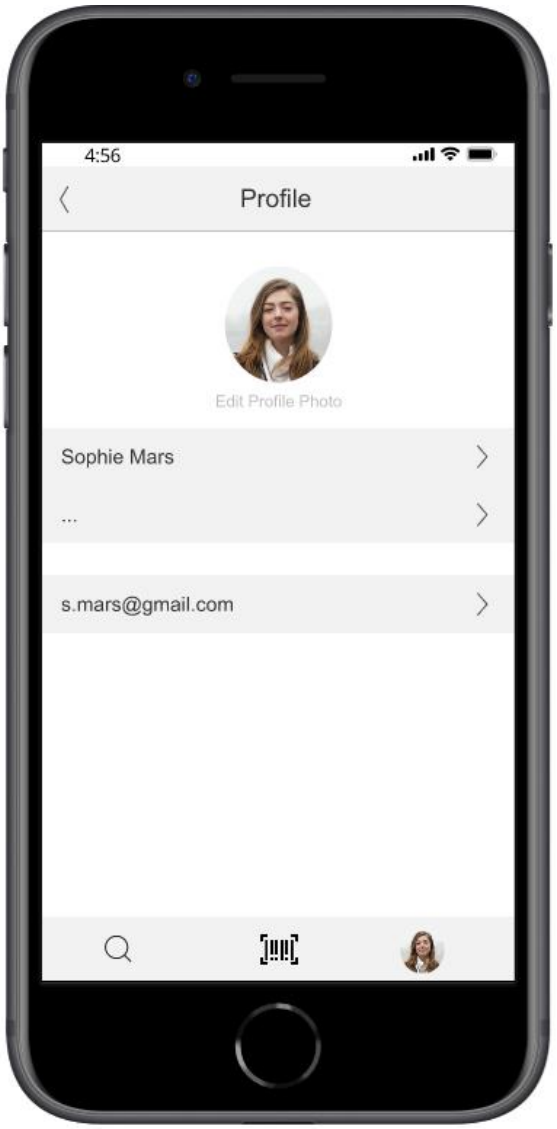
Comment page



Personal page



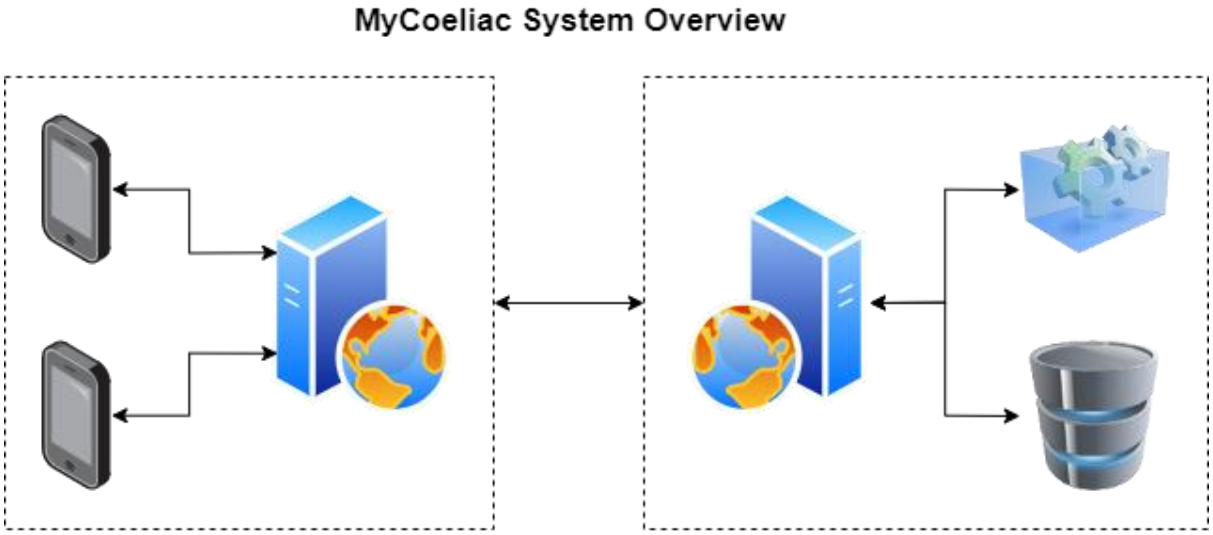
Settings page



Profile page

Loading page

8 System Overview

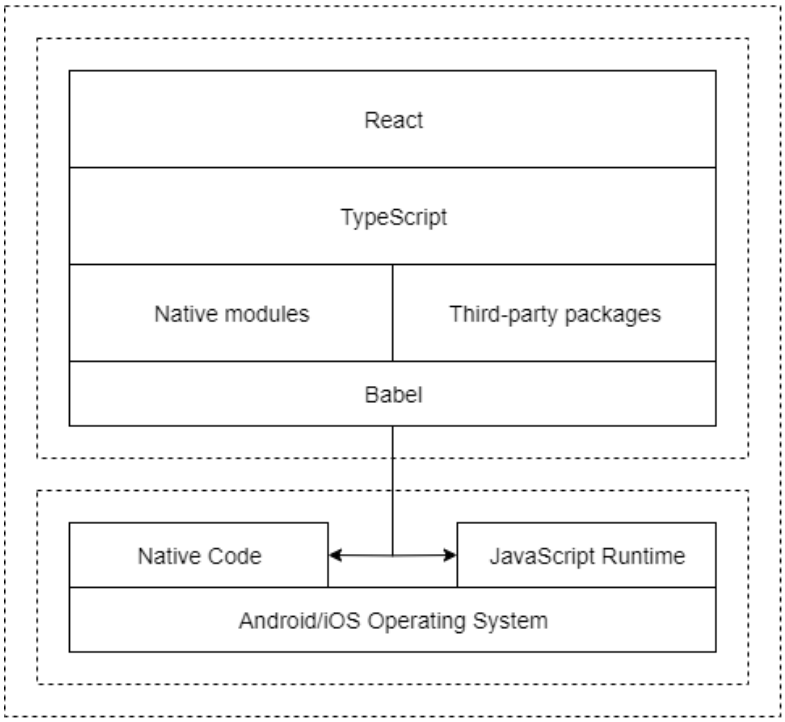


The above image illustrates the global overview of our system. The system consists of two subsystems the front-end (on the left) and back-end (on the right).

The front-end subsystem is responsible for handling the connection between the end users and the backend. The backend subsystem is responsible for handling the actions of the end users.

8.1 Front-end

The front end is created using React native and Typescript. Bu using Typescript we can control what type of data is used by our components and the text editor/IDE notifies the developer if they are trying to work with wrong types. This increases the maintainability of our app.

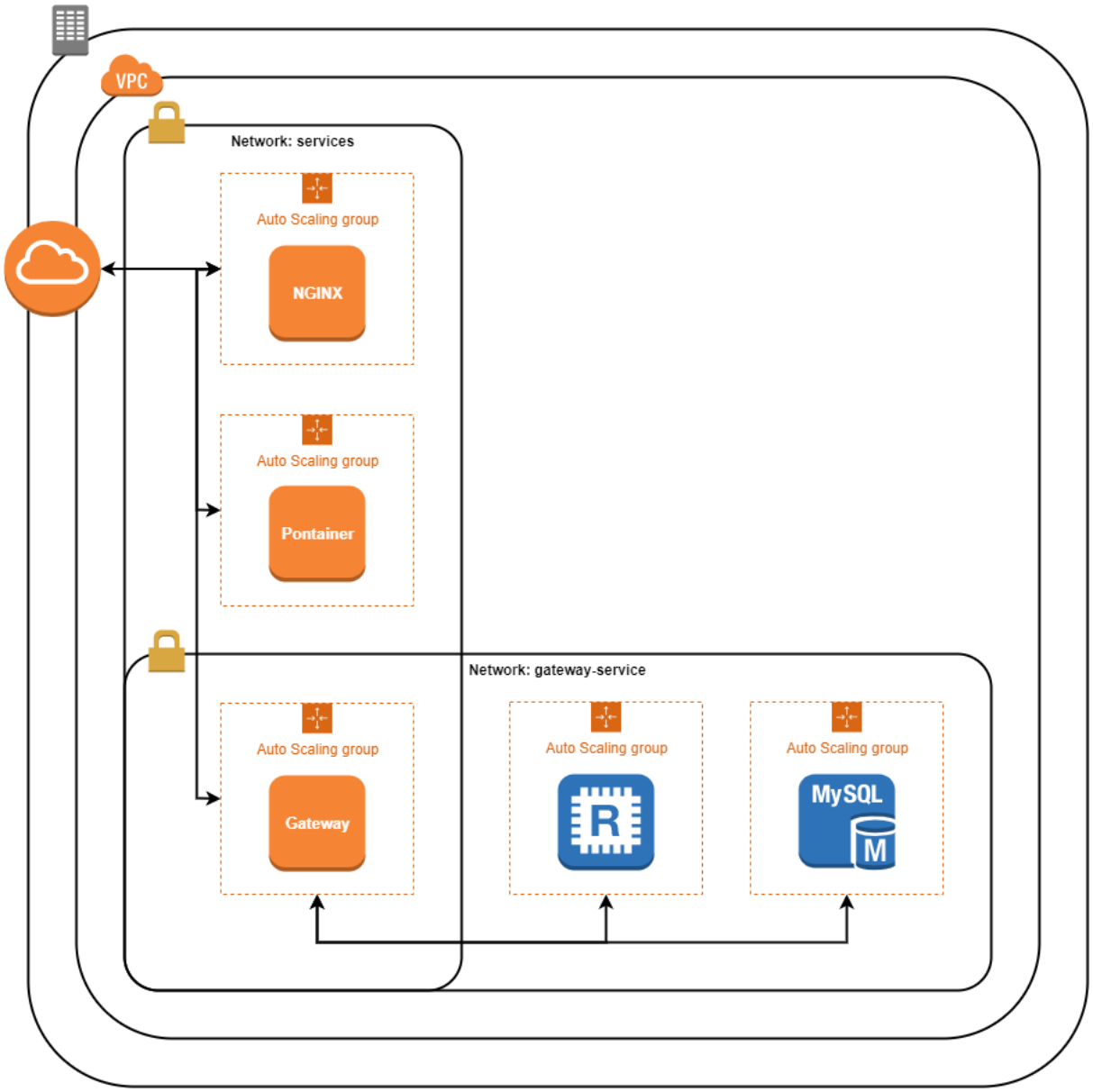


The structure of the front end is based on the atomic design pattern: http://atomicdesign.bradfrost.com/chapter-2/. This allows us to create highly maintainable and reusable components which can easily be used in future projects.

The front end uses a combination of native modules from React Native and third-party packages. The front end also makes use of JSX syntax in our components, which gets converted to vanilla JavaScript by Babel.

React Native also converts the JavaScript to native Android/iOS code, so that our app can run natively on both Android and iOS devices.

8.2 Backend



The backend is based on the microservices principle using Docker. Within the backend there 5 services. The NGINX-service is responsible for handling the incoming HTTPS requests and passing those requests to the upstream Docker containers. The Portainer-service allows the administrator to manage the Docker host through a web interface. The Gateway-service is responsible for all API requests. It is also the only service that can access the Redis and MySQL service, as they are in a dedicated network.

The current setup allows for scaling the Gateway-service to any number of instances that the system can support with its available resources. All services can grow (and shrink) whenever they need more resources.