**Inhaltsverzeichnis**

[1. Introduction 2](#_Toc524025345)

[2. Initial situation 2](#_Toc524025346)

[3. Objective 2](#_Toc524025347)

[4. Stakeholder 2](#_Toc524025348)

[5. Use Case 3](#_Toc524025349)

[5.1 Use Case 1 3](#_Toc524025350)

[5.2 Use Case 2 4](#_Toc524025351)

[5.3 Use Case 3 5](#_Toc524025352)

[5.4 Central Use Case 7](#_Toc524025353)

[6. Functional requirements 7](#_Toc524025354)

[6.1 Essential requirements 7](#_Toc524025355)

[6.2 Optional requirements 7](#_Toc524025356)

[7. Non-functional requirements 8](#_Toc524025357)

[7.1 Usability 8](#_Toc524025358)

[7.2 Reliability 8](#_Toc524025359)

[7.3 Performance 8](#_Toc524025360)

[7.4 Changeability 8](#_Toc524025361)

[7.5 Maintainability 8](#_Toc524025362)

[7.6 Security 9](#_Toc524025363)

1. Introduction

The following work was developed as part of a university project. The beginning of the project was on the (16th of April) and was initiated by an introduction date. The project lasts one year and consists of two parts. Both parts will be presented. The first part after a half of year and the other after one year. Both parts build on one another. Students are working in teams and are coached by tutors. Each team works on its own topic and has an own tutor who is also responsible for the evaluation of the work. The teams work self-dependent and meet with the tutor in a two-week rhythm.

1. Initial situation

This work deals with the measuring of the shopping time of customers in supermarkets. The project team cooperates with the supermarket chain “Kaufland”. Kaufland is researching how different sensor techniques can be used to achieve a shopping time measurement. With the help of shopping time measurement Kaufland wants to achieve a higher customer satisfaction. The aim of the project is to support Kaufland in the research and to exchange the results.

1. Objective

The project team has decided to follow the top-down strategy. That means that first a business model is designed on which everything else builds. Requirement criteria are derived from the use case. After that the research phase begins which deals with four sensor technologies. The four technologies are Augmented Reality, Beacons, RFID and different camera system, especially VLC. They are analysed if they are suitable for the implementation of the business model. After the research, the technologies are evaluated. The best technology can be used in the second part of the project for a prototype.

1. Stakeholder

This chapter lists the people who are interested in the results of this work:

* The responsible tutor Sebastian Kotstein
* HHZ
* The cooperation partner Kaufland

1. Use Case

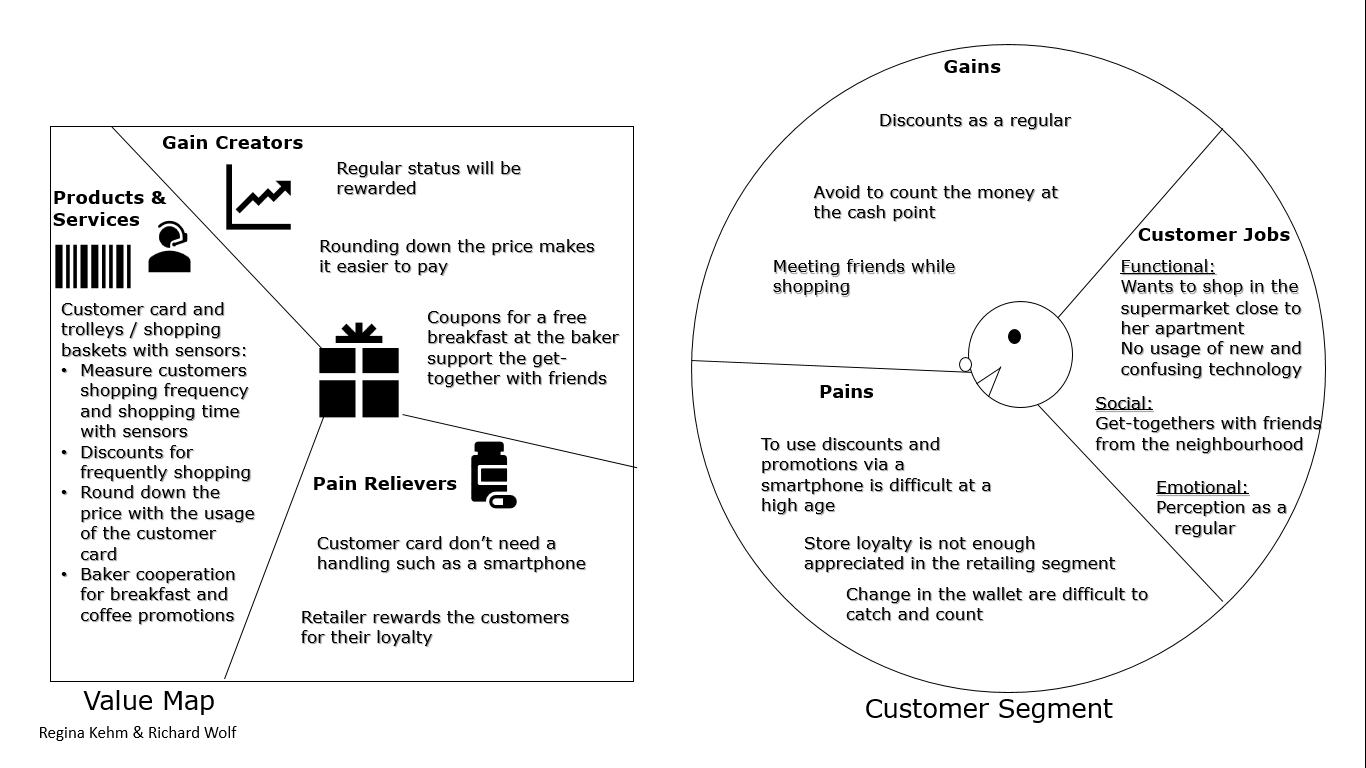
The following chapter describes three use cases that arose during brainstorming. They have the goal of generating customer benefit or business benefits and are all concerned with the shopping time measurement. The three use cases should address three different user groups. In the following, the scenario, the associated Value proposition model (VPC) and the Business model canvas (BMC) are presented for each use case.

* 1. Use Case 1

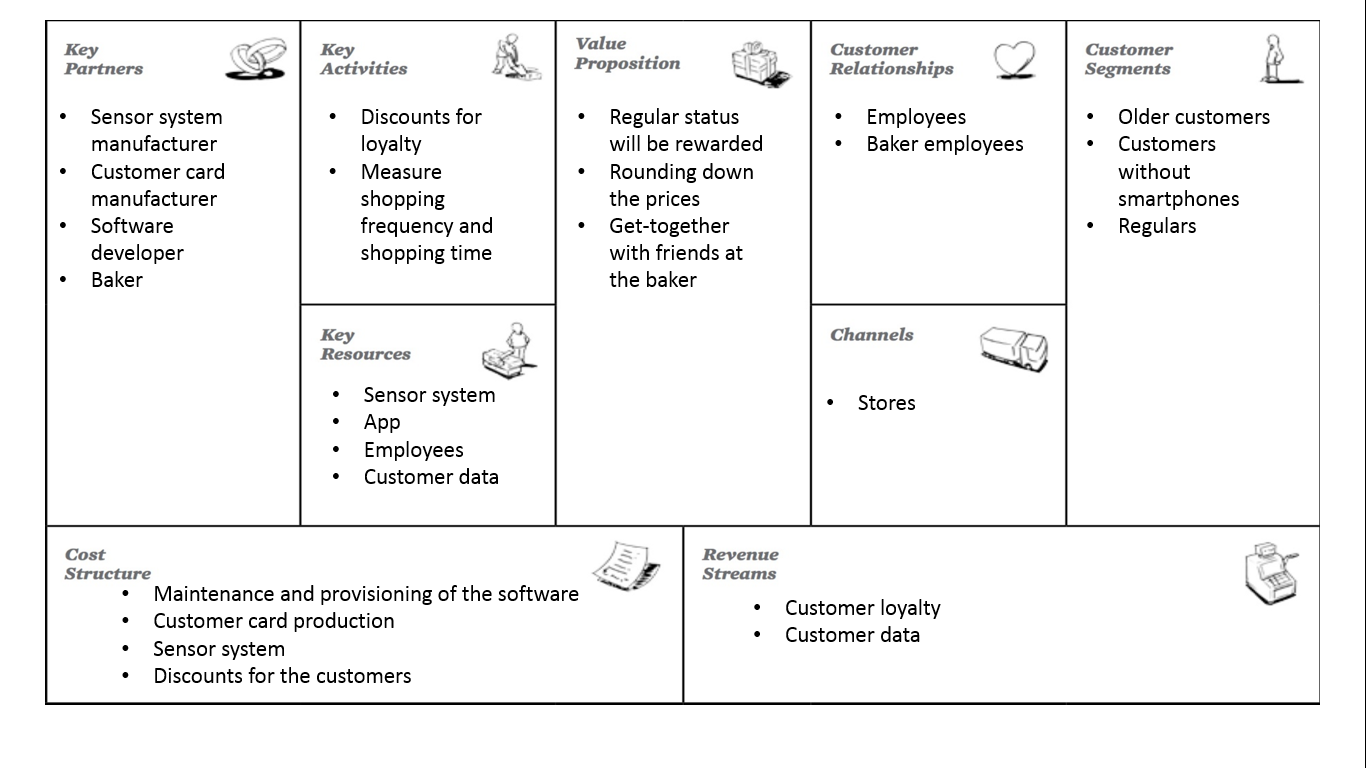
Scenario:

In the first scenario the central character is Gertrud, a pensioner. She is a fictional example for the group of customers that don’t use a smartphone. Since her husband died, she lives alone. She goes always shopping in the supermarket close to her apartment. Because of this she is a regular customer in this supermarket and want to be rewarded for this. But the rewards should not be offered via a smartphone. Due to her age she doesn’t want to use such devices. A get-together with friends at the supermarket would be nice as well.

**Value Proposition Model:**



**Business Model Canvas:**

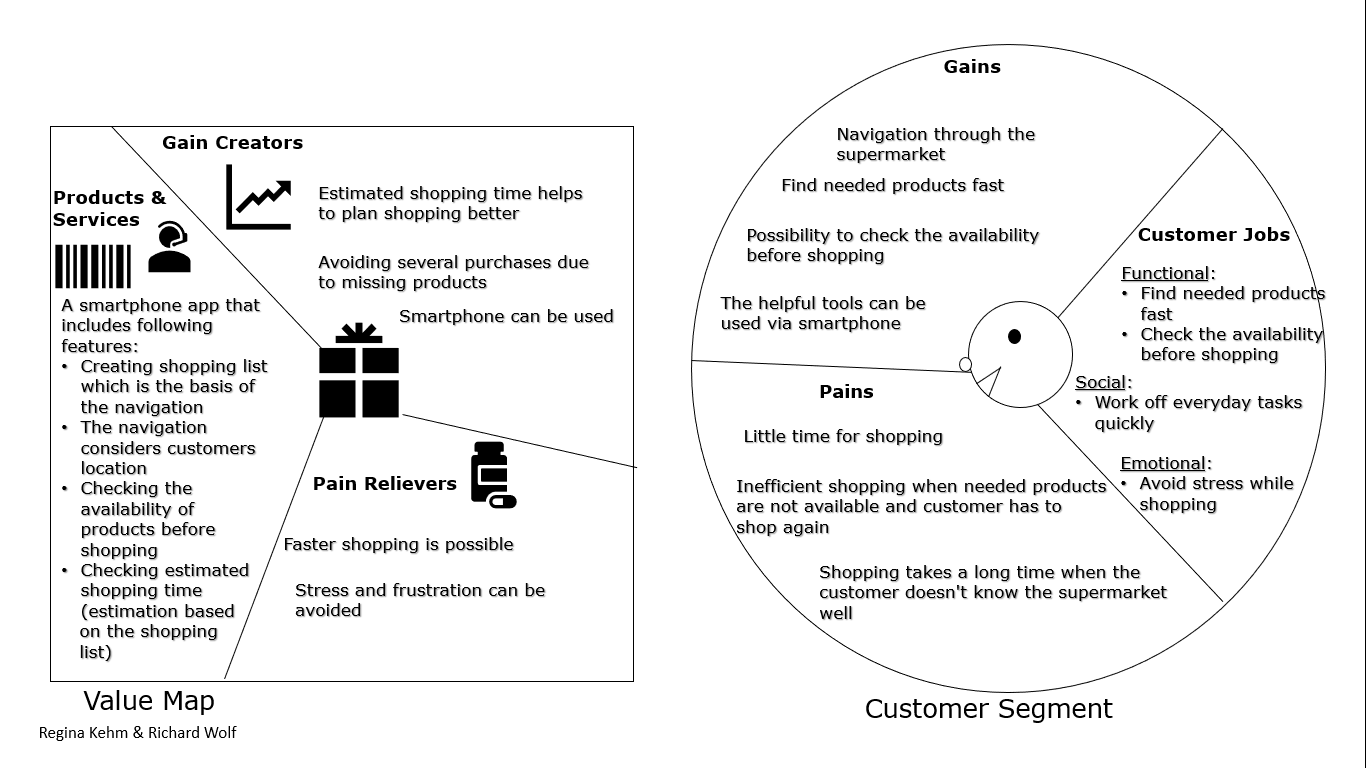


* 1. Use Case 2

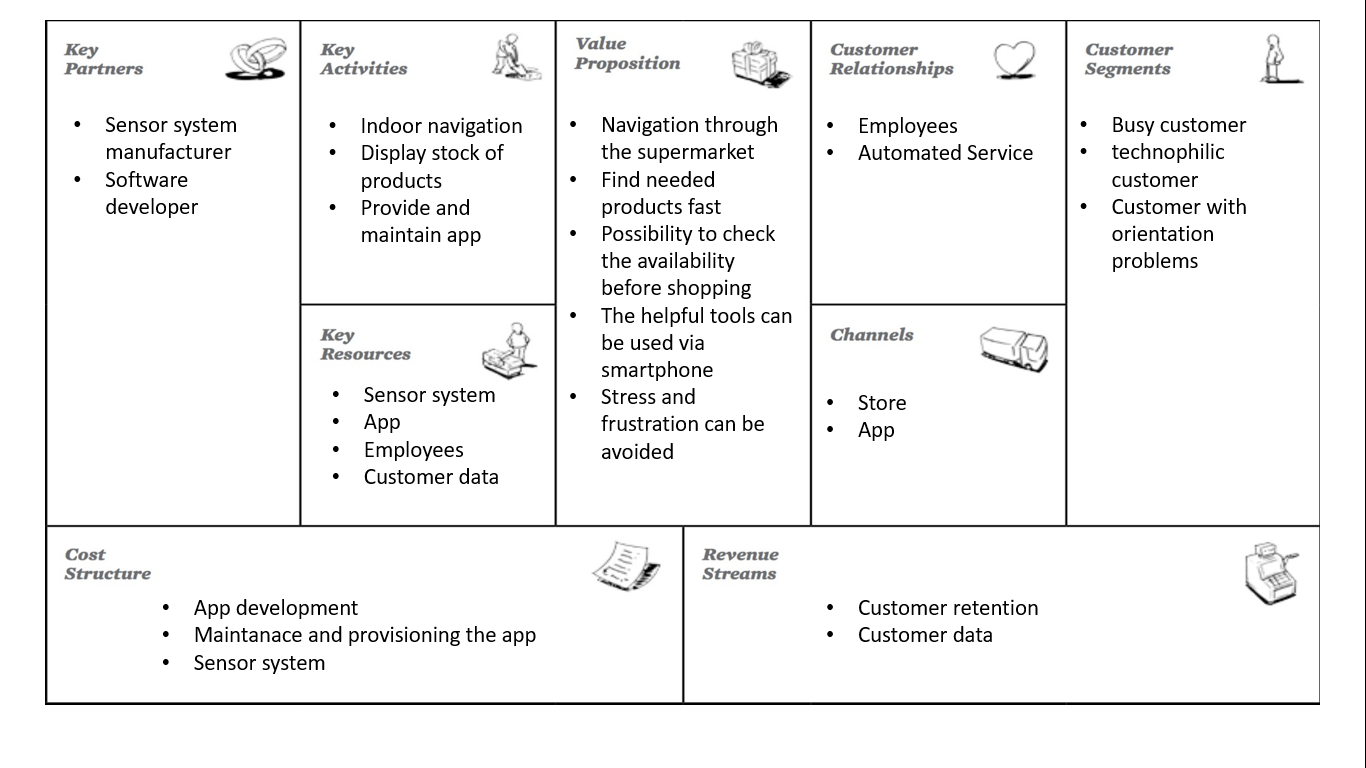
Scenario:

In the second scenario the central character is Sabrina, a medical student. She displays a fictitious role and corresponds the perfect target group for the later prototype. She is new in town and due to her study very busy. For her daily tasks Sabrina has not a lot of time. For every support that helps her saving time she would be very grateful. Shopping food is very time consuming. Nearby is a supermarket where she wants to buy food for her daily needs. It’s very large and some products are difficult to find. A navigation tool which corresponds the products on Sabrina’s shopping list and helps her to find the shortest path to the searched products would be very helpful. In addition, it would be nice if Sabrina can avoid visit the supermarket if the products she is looking for are not available. Sabrina has always her smartphone with her. So, it would be an advantage if the desired features could be used via smartphone.

**Value Proposition Model:**



**Business Model Canvas:**

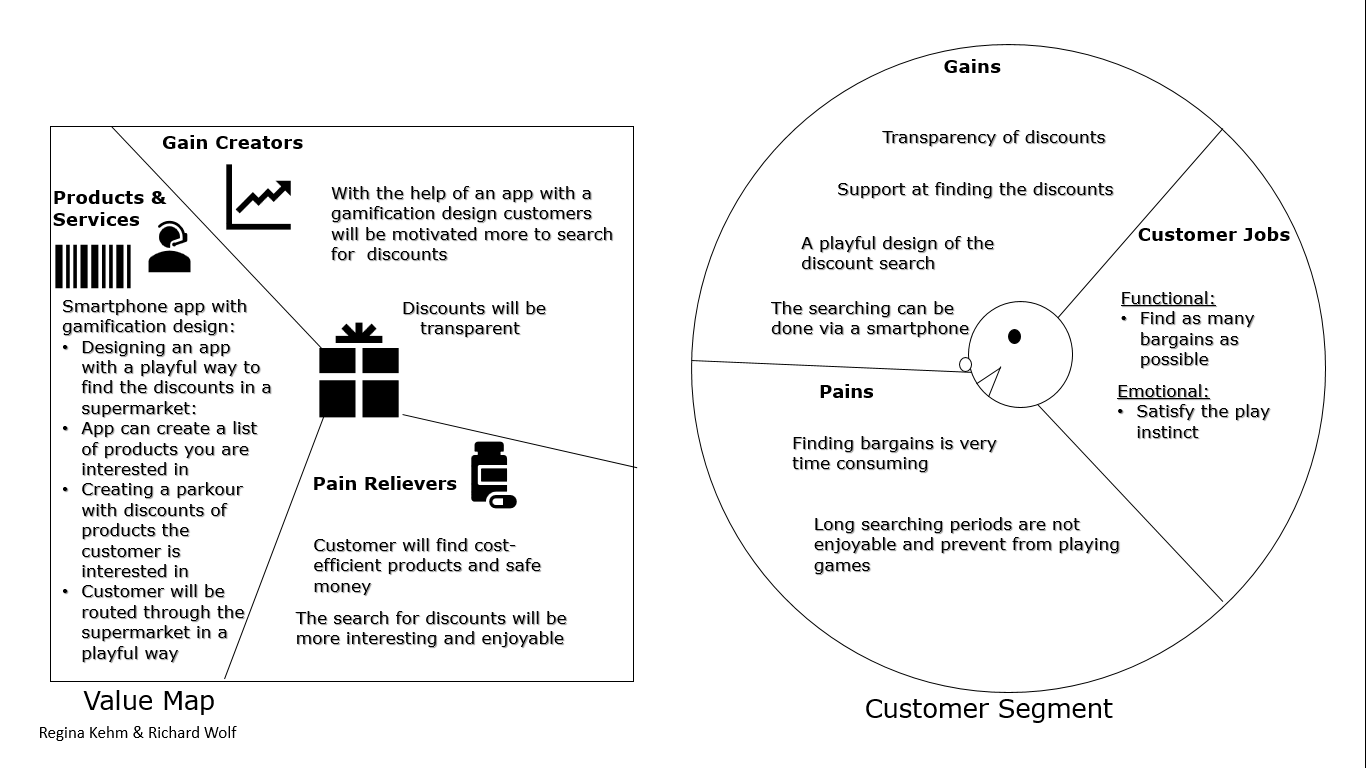


* 1. Use Case 3

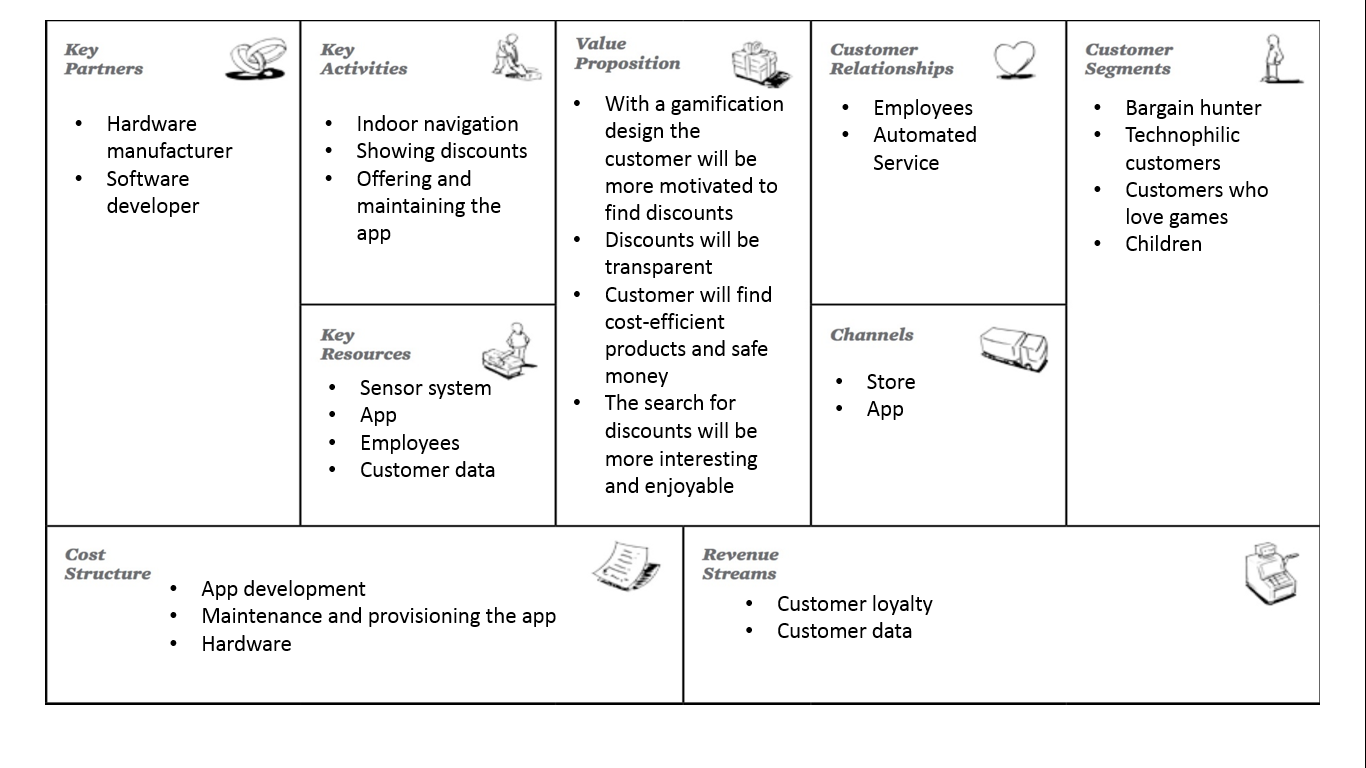
Scenario 3:

In the third scenario the central character is Jochen, a 40 years old bargain hunter and he loves games. He likes to go to a supermarket with many discounts. But mostly the supermarkets are too big to find all good discounts. It’s also boring and exhausting to find these discounts and it’s far away of being enjoyable. He would be happy about an app that shows all available discounts and where to find them. It would be perfect if the app shows him the discounts in an enjoyable way in form of a game.

**Value Proposition Model:**

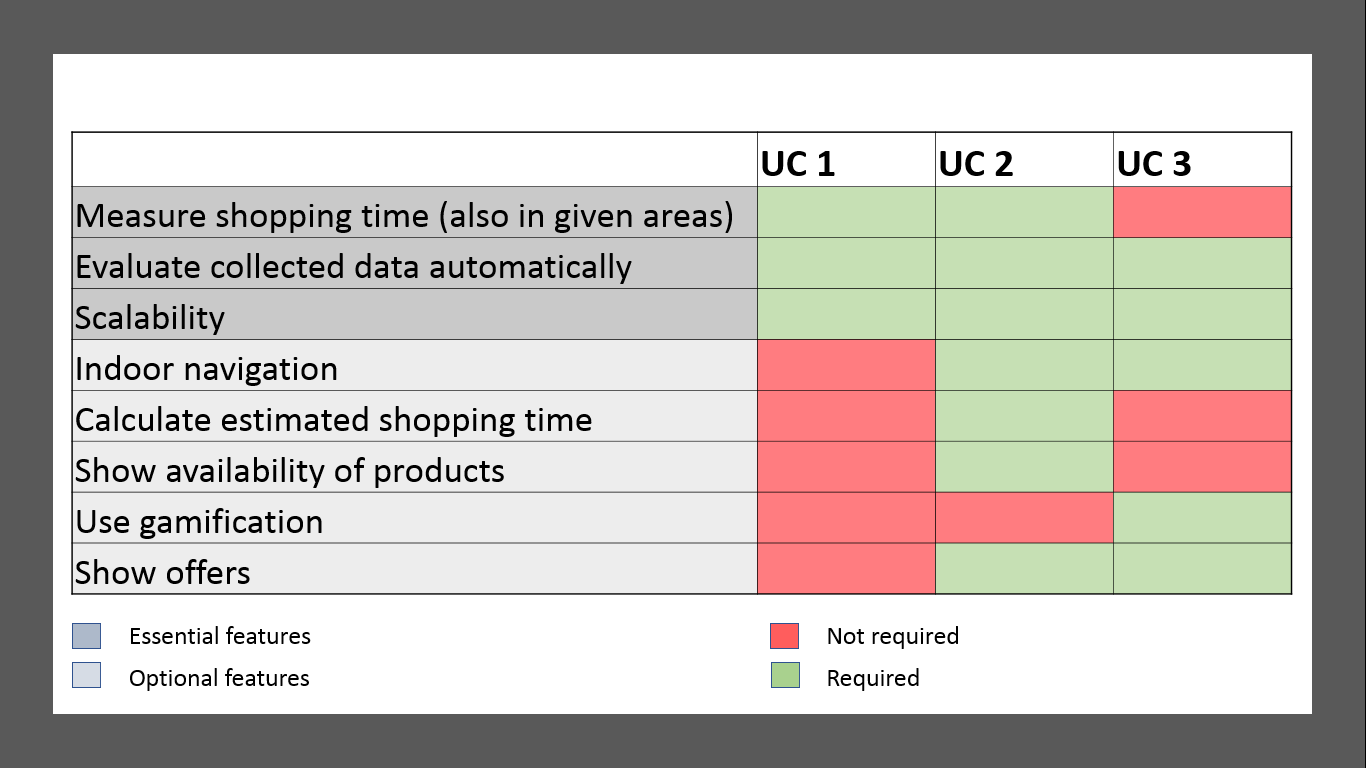


**Business Model Canvas:**



* 1. Central Use Case

The following table shows the identified features in all listed use cases:



The table shows that the most features will be covered by use case 2. That’s the reason why use case 2 will be the central use case. Further work will build on that use case. The feature that is not required for use case 2 will be anyway considered as an optional feature.

1. Functional requirements
   1. Essential requirements

* The product should determine the shopping time of the customers. Determining the shopping time means the total shopping time as well as the shopping time within an area.
* It should be possible to evaluate the collected data automatically to generate a business benefit.
* It should be possible to use the product also in other stores without modifying it.
  1. Optional requirements
* The product should contain a shopping list or should integrate a shopping list from another product or system.
* The product offers an indoor navigation that helps customers to find the desired products faster. The indoor navigation should base on the products on the shopping list.
* An estimated shopping time based on the shopping list can be requested before shopping.
* Availability of products can be requested before shopping.
* To entertain customers the product contains one or more games (e.g. paper chase).
* The product informs the customer about interesting offers.

1. Non-functional requirements
   1. Usability

* The product should be easy to understand
* If necessary, the product should contain an integrated operating instruction.
  1. Reliability
* Localization und duration of stay should be accurate as possible.
* The product/system should have high availability.
* Entered data should be saved to prevent data loss.
  1. Performance
* The requested data should be displayed quickly to the customer.
  1. Changeability
* The product should have open interfaces to allow the replacement of integrated frameworks or tools.
* It should be possible to modify and extend the product easily.
  1. Maintainability
* Errors are recorded centrally and can be evaluated later.
* Monitoring tools are used to detect and eliminate major problems and failures at an early stage.
* Customers can contact a service team if they have technical problems with the product.
  1. Security
* The product evaluates the data anonymously.
* Personal data is encrypted.
* The product should be developed according to the latest security standards.
* The product should protect personal data from unauthorized access (e.g. password).