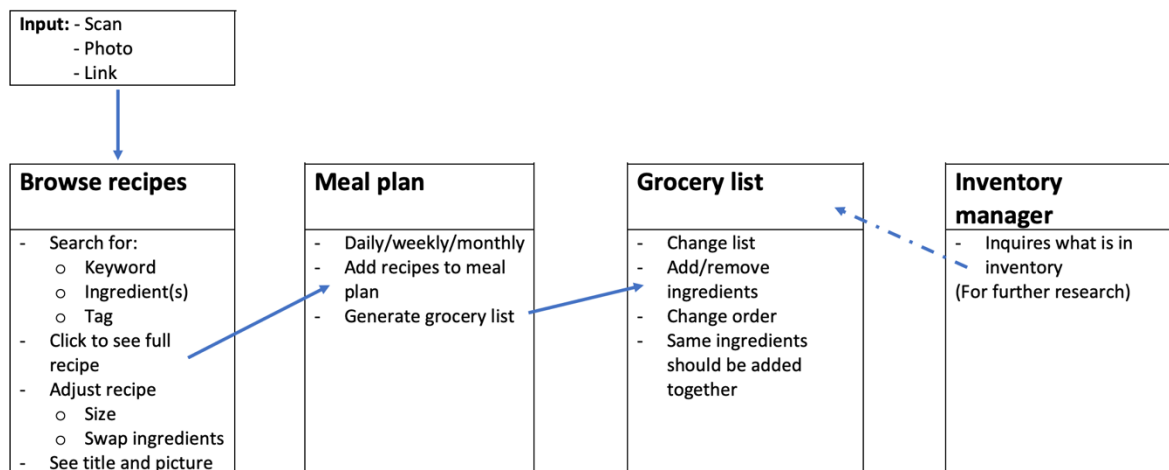


Recipe and Meal management mobile application for Willieanne.nl

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Abstract

Everyone changes when they age. Women between the ages of 40 and 60 years might experience these changes in a disadvantageous way. When they transition into the so-called perimenopausal state, they could expect several physical discomforts. These discomforts range from pain in the joints and muscles to fatigue to anxiety and depression. Some studies have shown that improve these discomforts or even prevent them. In this study possibilities of combining a proper diet for women over the age of forty with the concept of mHealth (mobile health). For this we are trying to answer the question: *How can an app be developed that aids women over forty with organizing healthy recipes from different sources, such that menopausal symptoms might be reduced?* To find the answer to this question there will be several stages that this project goes through. First, similar products will be researched in the so-called “state of the art”. Next the requirements will be researched. Then a prototype is developed. This prototype is evaluated and re-iterated. Lastly the requirements will be evaluated, and a conclusion will be drawn. The conclusion of the aforementioned question is in the form of one final prototype of which the functionalities and design are evaluated and of which is concluded that the requirements are valid and efficacious. Further recommendations include, expansion of the system as well as research into realizing the prototype.

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Chapter 1: Introduction

Human bodies are always transitioning. The biggest transitions of a female body are in the prepubertal stage and in the perimenopause or menopause transition stage (Manning, 2019). In the perimenopause stage, a change in oestrogen levels takes place (Caruso, Masci, Cipollone, & Palagini, 2019). This hormonal change has an impact on several different areas of the body. The reduced amount of oestrogen can, for example, lead to insomnia, depression (Caruso et al., 2019) and more friable, dry, inelastic mucosa that is prone to irritation, injury, and infection (Manning, 2019) and vasomotor symptoms, such as hot flashes and night sweats (Bacon, 2017; O'Neill & Eden, 2017). Of a survey of over 700 perimenopause women, 76,4% reported menopausal symptoms (Zhao et al., 2019).

It is imaginable that these symptoms can cause great inconvenience. Luckily there are ways to reduce the symptoms. One of these ways is by adopting the proper diet. There have been studies researching what kind of effect diet might have on perimenopausal symptoms (Xi, Mao, Chen, & Bai, 2017). In their study Xi et al. (2017) conclude the following “The randomized controlled trial [n = 30] showed that health education combining diet and exercise supervision was a valid treatment in women with mild to moderate perimenopausal syndrome as it provides adequate relief from menopausal symptoms without significant side-effects, which are usually a cause of concern for the patient.” (p. 154). Beezhold et al. (2018) provided a study where women between the ages of 45 and 80 who followed a vegan, vegetarian or omnivore diet were compared to see which diet can reduce perimenopausal symptoms the most. The study concluded that in their control group women following a vegan diet had reduced menopausal symptoms, which is why they hypothesize that consuming greater quantities of plant-based food and less meat in combination with regular physical activity might be beneficial to those suffering from menopausal symptoms (Beezhold, Radnitz, McGrath, & Feldman, 2018). Though existing literature has not focussed on veganism, Beezhold et al. (2018) state that the idea of increasing plant-based food and reducing meat is consistent with previous literature.

Willieanne.nl is a company that helps women over the age of forty, an age at which women often start experiencing menopausal symptoms with how to create a diet that makes them feel energized and helps them lose weight and also fits their lifestyle. CEO Willieanne van der Heijden is a dietitian that helps these women accomplish this. Her approach is that you can make simple, gradual changes towards a better diet, without making extreme changes overnight. Her clients are often women with a husband and children. It is important that the families don't all have to follow a strict diet, but rather make conscious choices on how some changes would affect the family. She has an online learning environment and gives weekly consults via Skype or WhatsApp video calling. To give the clients grip on their own diet, to make it as sustainable as possible. She encourages women to find their own recipes and customize them, so they work for their situation. This results in women clipping and printing out recipes and storing them in a big binder without much organisation. The clients learn which products have the best nutrient requirements. They receive new recipes as inspiration. Furthermore, they learn about smart meal planning, inventory management, doing groceries and efficient storage.

An opportunity arose for a tool that can store these recipes and make it easier for her clients to navigate the recipes and adjust them. There are already some tools out there that achieve a similar goal, but none were completely suitable for the Willieanne.nl clientele.

The goal of this project is to research what tool would help Willieanne and her clients best. What the underlying design aspects, both front- end and back-end, are important and how should they be implemented. With this research, a prototype will be developed for her and her clients to test. The prototype will go through several iterations to get a clear image of what the final product should be.

This project will first research what the state of the art is in this field, this will compose chapter 2. The process followed after that is the Creative Technology design method which will be explained in depth in chapter 3: Methods and techniques.

Chapter 2: State of the art

2.1 Possible directions for the project

In this project a tool will be designed that will help dietitians and women with making their diet easier to stick to and to keep organized. When speaking to the client a lot of ideas emerged from both sides. In this chapter, the most prevalent ideas will be explained.

2.1.1 Smart fridge tool

One of the first ideas that came up was the idea for a device that will help keep an inventory of what ingredients someone might have in their pantry, cupboards, fridge or freezer. This device might be particularly helpful when a client is given a meal plan for the week and needs to buy their groceries, but don't really know what they already/still have in the fridge. Technical possibilities will be explained in section 2.2.1 similar tools.

2.1.2 Mobile application

The second idea is that of a mobile application. Of which the most important features would be that there will be input from different sources (written, websites, PDFs, etc.), and the system would have to be easily expandable, also by other programmers. Other Features could include; a way to import recipes and organize them easily, search the database of recipes based on different inputs, like ingredients or prepare time, put the recipes in the database into a (weekly) meal plan to manage diet more easily and turning that meal plan into a grocery list. This option could also be combined with the smart fridge tool idea.

2.1.3 Website

The thirds main concept that was discussed was that of a website or web application. Basically, having the same features as the mobile application, except it would be web-based, so that the clients do not have to have a smartphone, they could also use it on the computer. Being web-based also gives the opportunity to use the tool over multiple platforms.

2.1.4 Additional ideas

Speaking with the client additional ideas were formed. For example, an (web) application where the client can make weekly meal plans and could automatically send those meal plans to her clients via email. There is also an opportunity to combine the idea described in chapter 2.1.2 with the way Willieanne.nl educates her clients. So, while the tool can be used to make the management of diet easier the clients are also educated with how to keep up a proper diet. Furthermore, there was a concept for a tool that would help the clients easily communicate with the company when they have questions or need some encouragement and the company could also communicate back with information, news and/or encouragements.

2.2 Current state of affairs

2.2.1 Features/requirements

In this chapter, similar tools to what the client has described will be discussed. In the tables provided several features will be compared between the tools. These features are some of the things that might be used in the preliminary requirements or chapter 2.3.2. These features include:

- Whether the available smart fridge tools come with a smart container
- Whether there is a tracking device in this fridge that measures the environment, such as temperature, moisture, whether there is spoiled food, etc.
- Whether the product is already fully developed or still in the prototyping phase
- Whether the user can scan the barcodes of products to keep inventory
- Whether the user can automatically generate a shopping list
- Whether the product is available in Dutch
- Whether the product uses the Metric System
- What does the product cost?

In short the questions above are meant to be easily comparable and say something about the functionalities of the product that are desirable.

- Whether the product has a recipe binder, and to what extent (can the client upload their own recipes)
- Whether recipes can be uploaded from different media (written, printed or scanned)
- Whether the client can customize the recipes they upload, for example, recipe size or swapping of ingredients
- Whether the product is user-friendly
- Whether the product is open sourced
- Whether the product has a corresponding website or application

Of course, for the different concepts, different requirements are applicable, this has been taken into account with creating the tables.

2.2.1.1 Smart fridge tools

Smart refrigerator by Kwon, Park and Chang (Kwon, Park, & Chang, 2016):

This paper presents a feasibility of smart refrigerator to monitor food intake based on sensor information for healthcare. We demonstrated the discrimination of food, which is an important component in monitoring food intake. Smart refrigerator testbed is composed of three main parts: 1) a sensor-equipped container, 2) an information server, and 3) a maintenance application.



Figure 1: Test setup Smart refrigerator by Kwon, Park and Chang

FreshFridge: (<http://www.freshfridgeapp.com>)

FreshFridge is a kickstarter project that contains a Smart Container as well as small sensors that are placed in the refrigerator. The idea is that the container and sensors keep track of several variables within the fridge, such as moisture and bacteria. With this information the container calculates whether the food inside is still good. In combination with the app you can keep track of what is inside the containers and thus the fridge. A working prototype has not yet been published.



Figure 2: promotional picture of freshfridge

Table 1: features smart fridge

FEATURE	SMART FRIDGE (KWON ET AL.)	FRESHFRIDGE
CONTAINER	Yes	Yes
SENSOR IN FRIDGE	Yes	Yes
ACCOMPANYING APP	Yes, for maintenance	Yes
FULL PRODUCT	No	Yes, on Kick-starter
PROTOTYPE	Yes	No
BARCODE SCANNING	No	Yes
SHOPPING LIST	No	Not yet, is being developed
GENERATE GROCERY LIST	No	Yes

AVAILABLE IN DUTCH	No	No
USES METRIC SYSTEM	Yes	No
COST	Not on market yet	20\$ on Kick-starter

2.2.1.2 Mobile applications

The Cookbook App: (<https://thecookbookapp.com>)

Cookbook is a multiplatform recipe manager. It has several features, such as a recipe binder, where you can add and browse recipes, meal plan function and calorie tracker. It is one of the most popular meal managing apps on the market. It is available on both Android and iOS devices and has a website.

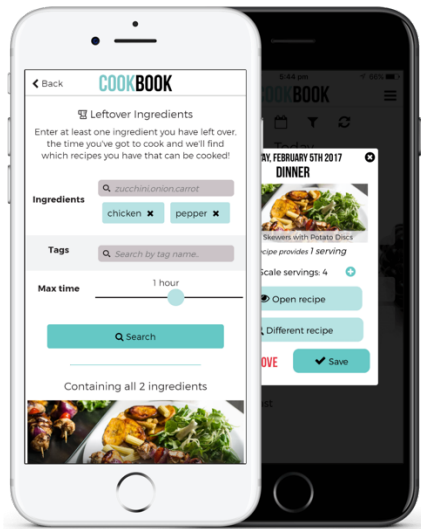


Figure 3: Promotional pictures of the Cookbook application

Paprika: (<https://www.paprikaapp.com>)

Paprika is an app that is similar to the Cookbook app with regard to functionalities. The big difference, however, is that with the Cookbook app you can add your own recipes and with Paprika you can only pick healthy recipes from their database. Paprika is similar in popularity with the Cookbook app. However, Paprika does not have the same intuitive interface. It is available for both Android and iOS and also has a website.

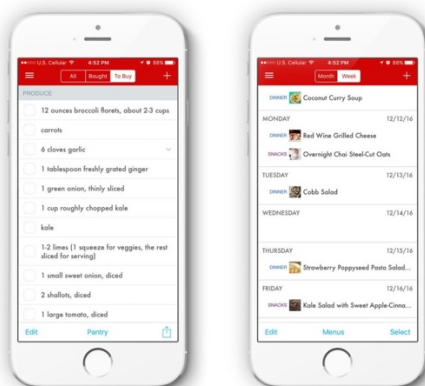


Figure 4: Promotional pictures of Paprika

Table 2: features mobile applications

FEATURE	COOKBOOK APP	PAPRIKA APP
RECIPE BINDER	Yes	Yes
DIFFERENT MEDIA	Yes	No, only import from own database
MEAL PLAN	Yes	Yes
CUSTOMIZABILITY OF RECIPES	Yes	No
GENERATE GROCERY LIST	Yes	Yes
USER FRIENDLY	Yes	Design could improve
OPEN SOURCE	No	No
HAS WEBSITE	Yes	Yes
AVAILABLE IN DUTCH	No	No
USES METRIC SYSTEM	Yes, converting option	Not automatically, but you can change shopping list/recipe yourself
COST	\$4.99	\$4.99

2.2.1.3 Websites

Recipe Cloud: (<https://recipecloudapp.com>)

Recipe Cloud is different from the application, because it is only web-based. You can upload recipes via links. You can browse them and drag recipes into a weekly meal plan. The interface is very clear and intuitive, making it very popular.

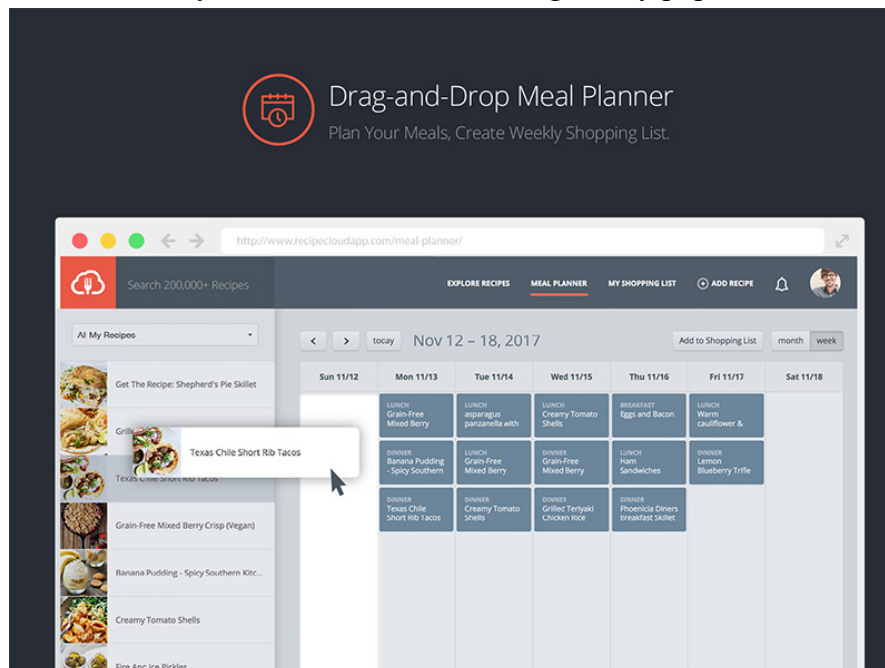


Table 3: features website

FEATURE	RECIPECLOUD
RECIPE BINDER	Yes
DIFFERENT MEDIA	No
MEAL PLAN	Yes
CUSTOMIZABILITY	No
GENERATE GROCERY LIST	Yes
USER FRIENDLY	Yes
OPEN SOURCE	No
HAS APP	Lite version is free, Pro version is \$9.99 per year

2.2.2 Literature review: Impact of diet applications

Since the uprising of smartphones in the mid-2000s, more and more is being discovered about what these devices can achieve. A new trend that seems to be emerging is mHealth, which is short for mobile health. In 2017 the total amount of commercially available mHealth apps was 325,000 (Chen, Berkman, Bardouh, Ng, & Allman-Farinelli, 2019, p. 218). The World Health Organization defines mHealth as “The use of mobile and wireless technologies to support the achievement of health objectives” (Kay, Santos, & Takane, 2011, p. 1). Health and wellness are very broad terms as they include diseases, diet, sleep, physical activity and more. For the purposes of this project there will only be looked into mHealth in relation with diet and nutrition with adults

There will be research conducted on the impact of mHealth promotion on behavioural change. To give insight into this topic, several papers and articles will be researched. First the scope of the research will be explained. Next there will be looked at the effectiveness of these mHealth promotions. Lastly light will be shed on the efficacy of mHealth with regards to diet change and adherence. At the end a conclusion will be formulated.

It is important to distinguish the concept of mHealth from the concept of eHealth. EHealth stands for electronic health. This means that any electronic tools to manage health fall in this category. For example, the use of computers and networks to store medical information. MHealth is a sub-segment of eHealth, focusing on mobile devices to cover medical health as well as public health. Though it is not an actual difference, mHealth is often seen as a concept that helps patients to gain some independence with regards to managing their health, while eHealth is believed to be a tool that helps experts with managing the patients. MHealth is also perceived as more personal.

Efficiency of mHealth promotion on behavioural change regarding diet

The general public is open to the concept of mHealth to improve their dietary behaviour, based on several arguments. First, it is hypothesized that mobile applications with regards to diet and nutrition might be the ideal platform for interventions (Gilmore, Duhé, Frost, &

Redman, 2014; Hingle & Patrick, 2016; Lee et al., 2018; Mauch et al., 2018). This is because of several reasons. Using mobile applications might prove very cost effective, as there is no need for expensive clinical treatment (Lee et al., 2018). They also give the general public opportunity to do their own extensive research as well as getting personal education with regards to behavioural change. However, Mauch et al. (2018) state that there remains a need to enhance app quality, as most available apps now focus on weight related outcomes rather than behavioural change. So, mHealth apps show great potential, but might to be reviewed to accompany behavioural change, rather than only stimulate weight loss.

Second, in the past years, the demand for mobile health promotions has increased a lot. However, studies show that the early adopters are people that are already partaking in health behaviours. The people for which these health promotions would be particularly effective will participate less (Hingle & Patrick, 2016). Lee et al. (2018) show that mobile app-based interventions could be useful for improving various health promotion behaviours including diet and physical activity for the general healthy population. Therefore, the early adopters might not be the target group for which the mobile interventions are the most effective, though they might benefit by improving various health promotion behaviours.

Third, science-based applications appear to be less popular than commercially developed applications. Mauch et al. (2018) state that there remains a need to enhance app quality and utilize behaviour change theory in app development as important precursors to app effectiveness. Hingle and Patrick (2016) argue that science-based apps are at a disadvantage because of the visual appeal as well as the user friendliness. From the apps that were reviewed in this study, the science-based apps were the least popular amongst users. Concluding, science-based applications could be more effective, however they appear to be less popular than their commercial counterparts. Improving aspects such as visual appeal and user friendliness might improve the effectiveness.

Lastly, all sources reviewed agree that mHealth promotion has great potential. Gilmore et al. (2014) argue that the increase of food intake and sedentary behaviour may be contributed to the technology boom, however this boom also gives a unique opportunity to direct management of obesity. Most articles also agree that strong evidence of the efficacy of mHealth promotion are just not there yet (Gilmore et al., 2014; Lee et al., 2018; Montagni, Cariou, Feuillet, Langlois, & Tzourio, 2018). “With the internet still outpacing mobile health apps and wearable devices as sources of health information and support among university students, this population is confident that digital health interventions will replace real-life consultations in the future, provided that they are promoted by official institutions such as the university or the national ministry of health.” state Montagni et al. (2018, p. 10). Thus, most sources agree that with the current rate mHealth is developing, it will have a great contribution to society, just not quite yet.

Efficacy of mHealth on behavioural change

There are a number of potential positive effects of mHealth on obesity and diabetes control. First, Lee et al. (2018) and Wang, Xue, Huang, Huang and Zhang (2017) have found that mobile app programs were effective in improving physical activity and healthy eating habits. However, Lee et al. (2018) recommend research into behavioural change as that was not adequately present in the studies he had researched. Park, Hwang and Choi (2019) performed a meta-analysis of 20 RCTs involving over 2,000 obese adults that provided scientific

evidence that mobile interventions have some effect in reducing body weight and BMI short term. Though it should be noted that there is not prove or sign of any long-term effects. In conclusion, there are some positive short-term effect of mHealth on improving physical activity as well as healthy eating habits.

The second possible positive effect is that individually tailored treatment and the ubiquity (existing or being everywhere, especially at the same time) of mobile applications could be big advantages of using mobile applications to improve dietary behaviour. There are several disadvantages that current clinical treatments have. Among these are personal motivation, high costs, memory bias and misreporting. Because of the extensive accessibility of mobile devices memory bias and misreporting can be greatly improved, because patients can report their food in real time (Chen et al., 2019). Mobile applications tend to be less intrusive than traditional treatment. Therefore there lay opportunities to individually tailor to personal motivation and resources, such as disposable income (Park, Hwang, & Choi, 2019). Park et al. (2019) hypothesise that mHealth can potentially provide customized treatment with minimum need for therapeutic intervention. For this last statement there is also evidence that there would still be need for therapeutic intervention except on a smaller scale.

Thirdly, multicomponent interventions appear more effective than stand-alone app interventions. According to Bray et al. (2016) there is some evidence that may point this way, however this has to be confirmed in controlled trial still. Stand-alone use of the app is cautioned by app-usability experiences that highlight challenges in navigating the app food database and selecting correct portion sizes and therefore should be accompanied by the proper expert education (Chen et al., 2019).

Lastly, the results from studies that showed a positive effect on obesity are not significant enough that there can be an absolute conclusion. According to the guideline for the management of obesity of SIGN, weight loss programs are successful when there is a decrease in weight by 5% to 10% (approximately 5 to 10 kg) minimum compared to the initial body weight. Therefore, a 2 kg weight loss in obese adults with a BMI of 25 kg/m² more is not sufficient to interpret as an effective result (Park et al., 2019).

Impact of mHealth promotions on behavioural change

Concluding, there is some basis on which we can answer the research question of what the impact of mHealth promotions is. Several articles have been examined and compared to find out what this impact of mobile health promotion is on behavioural change. These studies were within the scope of nutrition and diet for adults. Though some of the references also diverged to university students and children. However, the inclusion of these age groups did not seem to skew the results. MHealth might become a very powerful tool in the upcoming years as the results of the researched studies seem promising. But these results only showed short term effects, as the technology and field of research is too new to obtain long term results yet. Even with this in mind most articles agree that mHealth with regards to diet is on the rise, it is just not quite there yet. The studies also showed that the early adopters of the technology are people that already partake in health behaviours and that the target group for which it might be most effective is not represented yet.

Several studies have shown that there is some effect of mobile dieting applications on weight and BMI. However, some researchers are also wary that these results are not significant with regards to what is considered successful weight loss. Some studies say that

the focus of nutrition mHealth should shift from weight to behavioural change as it might prove more effective. MHealth could be a very powerful tool, but the science-based apps should adopt more of the commercial based apps' principals, such as visual appeal and user friendliness. Though the possibilities that health applications propose seem very promising, several authors state that stand-alone apps are not as effective as multicomponent interventions. Thus, the apps will not replace traditional treatment yet, but might enhance it.

2.3 Conclusion

2.3.1 Reflection/Ethical analysis

This sub chapter is to give insight into several potential ethical risks that have been identified. It is important to note that here the questions are only raised, but not answered. These questions are there to keep in mind during the design process that will take place during the ideation, specification and realization phases.

2 perspectives

There are two perspectives that are important to keep in mind when looking ethically into this GP. The first one is the impact of the app itself. Where does it stand with competition with other apps as well as other dietitians? The second approach will be of the diet changes that the app might impose. What is the impact of the person using the app?

Application impact

- Who are the stakeholders?
- Does it spark competition?
- What is the environmental impact of people using their phones more?
- What would be the role of dietitians?
- Will it be able to work together?
- Will the data in the database be shared?
- What happens with the data that is shared?
- Can it be hacked?
 - How easily?
- To what extend can dietitians see the data of their clients from the application?
- Are we inventing a problem that is not really there?
- Are there people that will abuse the system?
- How do we deal with eventual expansion of the project?
 - Who are the good people?

Dietary impact

- To what extend will the application lead to dietary change?
- What is the impact of dietary change on the economy?
 - Will there be an imbalance?
- What is the impact of dietary change on the environment?
 - For example, if we eat more or less meat?

- What is the impact on one's social life/status?
- Will the application make dieting easier?
 - Or will it have the opposite effect and make it more difficult?
- Are there any consequences that might not be obvious?
- Will we enable eating disorders?
- Is this an effective method to promote dietary change?
- Is this a tool to help people become better or a tool to keep them chained up?
 - Allegory of the cave?

2.3.2 Preliminary requirements

In chapter 2.1 and 2.2, the State of the Art with regards to smart fridge tools, dieting applications and dieting websites has been researched and described. From this research, it can be concluded that the best course of action would be to develop a mobile application that helps organize recipes, meal plans, grocery lists and inventory. As most women already have a smartphone and it isn't an invasive solution. Thus giving this solution the highest chance of being adopted by the target group. For this concept, preliminary requirements are in place. These preliminary requirements are described in this subchapter.

In the figure below (Figure 5: Visualisation of preliminary requirements.) the most important features are shown. The application will consist of three main components. First, a recipe database, where the user can add their own recipes from different sources, for example by scanning, taking a photo or putting in a link. The user should be able to easily browse through the recipes, put in search terms and adjust the recipe manually to fit their personal preferences. The second component will be a daily, weekly or monthly meal plan, that the user can fill out themselves. Possibly with a feature to save and load previous meal plans. From this meal plan a grocery list should be able to be automatically generated. This will be the last component on which this project will focus. A grocery list where the user could also add, remove and adjust ingredients. It should be noted that, though not included in the scope of this document, the possibility for further research into smart inventory management should be kept open.

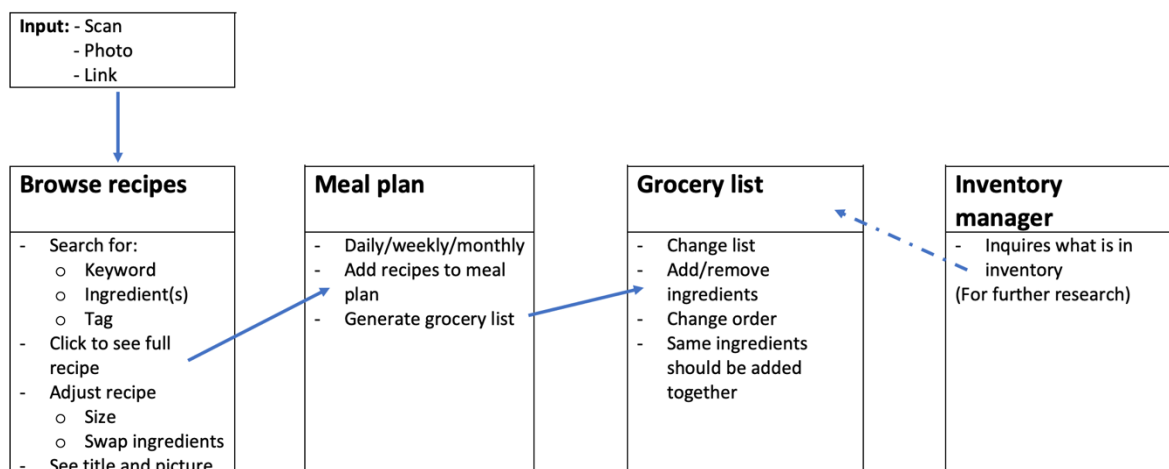


Figure 5: Visualisation of preliminary requirements.

The Willianne.nl company would value that this tool is going to be easy to use. It should be clear from the moment you open the app how you should use it. Which is the problem the company found with other alternatives, that their clients found certain tools, like spreadsheets, too complicated and wouldn't give them a try, or give up using them after a while. It would also be important that recipes could be imported from different resources. Meaning that women could take a picture of a written down, printed out or digital recipe and the tool would recognize it as a recipe and categorize it.

CEO Willianne reached out to the university to get help from a student to develop a prototype around this idea. She is a woman with many ideas, which is great. This does cause her to value expendability of the tool a lot. Therefore, this is something she would like to see back so that other programmers can easily pick up the project after the initial design is done. The main focus of the project will be on the recipe organizing aspect, but there will be research into (weekly) meal plans, automatically generated grocery lists and smart fridge tools as well.

What might make this concept stand out from other already existing apps is that there is an opportunity to implement the knowledge and way of education of the Tijd voor Pauze company. It can serve as a way for the clients to get extra support and information on top of the already existing programme and coaching experience. Expansion and elaboration of these preliminary requirements will be done in chapter 4: Ideation.

2.3.3 Research question/Study objective

Concluding from the research done in chapter 2, it would be most appropriate to go ahead with the idea of a mobile application. First and foremost, the client seems most satisfied and enthusiastic about this idea. Secondly, it is a way to improve upon existing applications with a similar goal from a scientific approach. Next, mobile applications show great potential in helping people implement behavioural changes with regards to diet, as shown in the literature review. Lastly, the people from the target group could benefit from such an application, as this will make managing a diet more approachable and easier to follow, by sticking to a diet their menopausal symptoms might be greatly reduced.

For this project, the proposed research question is:

How can an app be developed that aids women over forty with organizing healthy recipes from different sources, such that menopausal symptoms might be reduced?

With as sub-questions:

- *What should the main app functionalities be?*
- *What should the usability of this app entail, considering the target group?*
- *How can the iterative Creative Technology Design Process be used to achieve an effective prototype?*

Points to keep in mind during the duration of the project are, for example, how to reduce the ethical risks of the development and usage of the app. Of which questions were raised in the previous chapter 2.3.1. It is also important to remember the feedback that potentially could be

useful. It will be important to establish a test group of the target demographic that can test different iterations of the prototype. It might also be useful to keep in touch with experts that might be able to help with diet, app development or design.

Chapter 3: Methods and Techniques

3.1 Creative Technology Design Method

“Creative Technology is a new bachelor programme at the University of Twente. It is also a design discipline on a multidisciplinary basis. Its goal is to develop new and innovative products, applications and services. The designed products are for human usage, that improve quality of life in all its different facets, in work and recreation, in health and entertainment, in learning or in art. The design material is technology, ranging from new media to smart technology, using videos and sound, internet, all kinds of programmable platforms, sensors and actuators.” (Mader & Eggink, 2014) Because Creative Technology is such a new discipline this design method was developed to aid in the definition of the discipline. This method was made based on observations within the course as well as related disciplines.

The design process of Creative Technology that we suggest is illustrated in figure Figure 6: A Creative Technology Design Process. On the highest level it consists of four phases; Ideation, Specification, Realisation and Evaluation. Each phase starts and ends with a defined set of (intermediate) results.

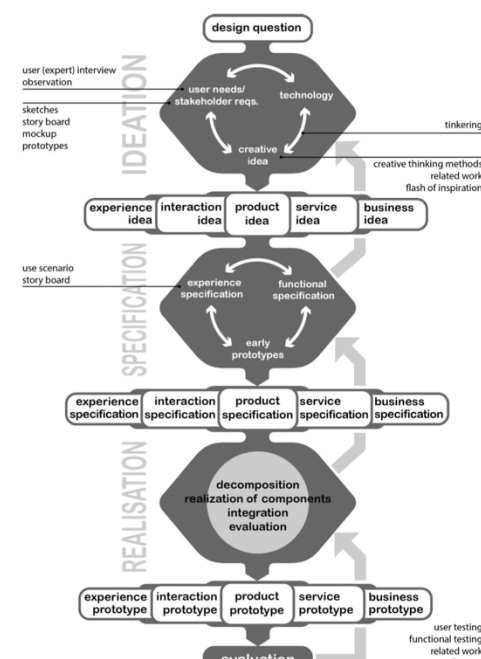


Figure 6: A Creative Technology Design Process

3.1.1 Ideation

Starting point of a Creative Technology design process may be a design question in form of a product idea, an order from a client, or a creative inspiration. Evaluating early ideas with clients or users applies similar techniques as other user centred design techniques, using mock-ups, sketches, user scenarios or story boards. Interviews with clients, users or user experts characterize the needs, describe the problem setting and provide requirements. Result

of the Ideation Phase is a (more) elaborated project idea, together with the problem requirements. (Mader & Eggink, 2014)

3.1.2 Specification

Characteristic for the specification phase is that a number of prototypes are used to explore the design space, and that a short evaluation and feedback loop is applied. Functionality influences the user experience, and demands on the user experience may require change of the functionality. These causalities are evaluated by using prototypes, with users, or possibly by the designer herself. Prototypes are subsequently discarded, improved or (partially) merged into new prototypes. The evaluation may also lead to a new functional specification, in its turn leading to a new prototype. (Mader & Eggink, 2014)

3.1.3 Realization

In the realization phase, the specification from the previous phase can be expanded. The goal of this phase is to confirm whether the end product meets the subsequent specifications. (Mader & Eggink, 2014)

3.1.4 Evaluation

Evaluation may address a number of aspects. Functional testing is typically already included in the realisation phase, but could also have a place here, and may address earlier functional requirements. Certainly, it has to be evaluated whether all the original requirements identified in the ideation phase are met. (Mader & Eggink, 2014). Mader and Eggink (2014) further state that “reflection is the basis for personal and academic progress”

3.2 Additional background knowledge needed

3.2.1 Design

2.2.1.1 User interfaces

The user interface, or UI, will be an important part of this project. The client has expressed that she values usability very much in the tool that will be created. The user interface is the part the application that the user will see and should be comfortable with. Important aspects to keep in mind are: colour, lay-out, size, readability and much more. In the ideation chapter of this project there should be extended research on what components will be appropriate. Sketches will be made and evaluated with a target audience.

3.2.1.2 Age-friendly and User-centric design

Age-friendly design

Age friendly design, a part of the concept of inclusive design, is based on the philosophy that older adults not only need special treatment physically, but also with regards to design of technology, infrastructure and other areas. It might be specifically of interest for this project, as the target group might not be elderly yet, but, especially regarding mobile devices, are often less fluent with technology than the younger generations. What can we learn from the concept of specific design elements for the elderly and how can we apply this to an age group

that is slightly younger? Roger Coleman (2018) states that the biggest problem to face with regards to inclusive design is thus: “We are currently in a period of rapid convergence between the market push of ageing populations and the consumer pool of equal rights legislation [...]. These factors will play a major role in shaping the future commercial and public service landscape, unless both sectors respond rapidly and appropriately, the consequences will be serious for the economy and society as a whole.” The solution, according to Coleman, is a four-step progress. The first step is to audit, meaning that, for example, a design team would need to become aware of any inequalities and keep them in mind. The second step is to understand, the design team should not only know of the limitations of elderly people, but also understand what implications this has. Third, is to improve, implementing the knowledge gained in the previous two steps, to improve the product. Lastly, the fourth step is to innovate, keep an eye out on how to keep improving the product by solving problems and keep the tool on hand to step in if needed.

User-centric design

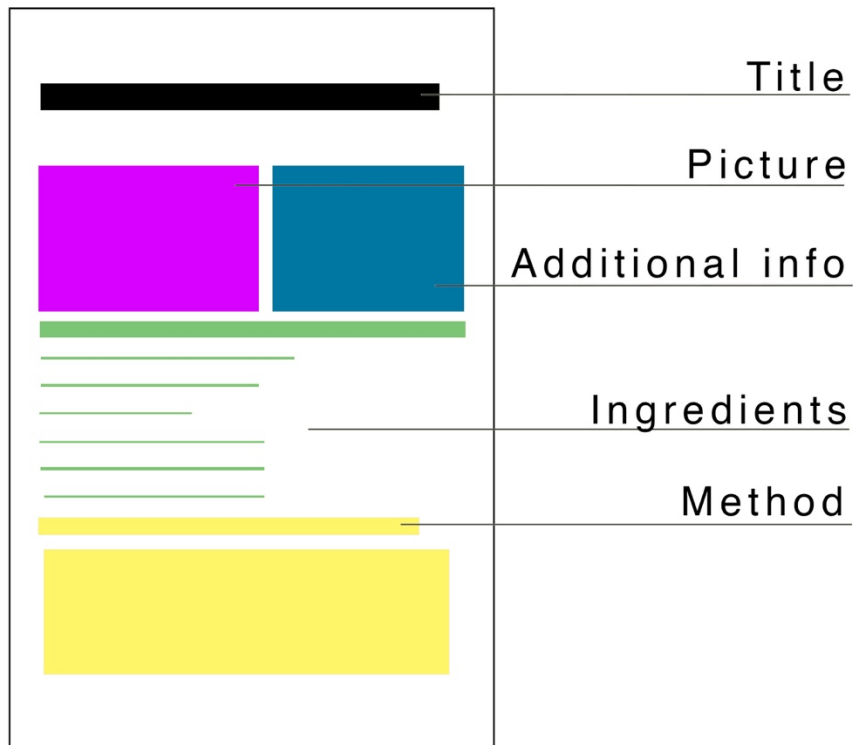
Travis Lowdermilk (2013) proposes in the following figure what user-centric design is about

- The world of usability is broad and focuses on the study of humans interacting with *any* product.
- Human–computer interaction (HCI) is a subset of usability that focuses specifically on humans interacting with *computing* products.
- **User-centered design** (UCD) is a methodology used by developers and designers to ensure they’re creating products that meet users’ needs.
- **User** experience (UX) is one of the many focuses of UCD. It includes the user’s entire experience with the product, including physical and emotional reactions.
- UCD is not subjective and often relies on data to support **design** decisions.
- UCD involves much more than making applications aesthetically pleasing. **Design** plays an important role; however, it’s not the only focus.
- UCD can actually save time by helping you avoid costly mistakes.
- UCD doesn’t distract us from getting work done. It ensures that we focus on the right things: meeting users’ needs with the proper technological solution.

These principles are important to use as the user is a central part of this project.

Components of a recipe

In the figure below the typical setup of a recipe is shown.



From this figure you can see that recipes often have five main components. These components are a title, a picture of the food, additional information, such as a preparation time or amount of servings, a list of ingredients and a method of making the recipe. Sometimes recipes have even more information such as the website or book the recipe comes from, the original author or a logo. It should also be noted that not all recipes have the same layout as shown above, however the order of information should be roughly similar. Following this structure should ensure that the users can easily navigate and enter their own recipes.

3.2.1.3 Which elements are important in designing an app interface

There are a lot of things to keep in mind when designing a user interface. Current literature gives a lot of different pointers on what is important. In this chapter several authors will be reviewed.

First, the website usability.gov (“User Interface Design Basics,” accessed may 2019). Being a collection of user experience elements, this web page gives a good basis of what to consider. In Table 4: user interface pointers usability.gov their biggest pointers are shown.

Table 4: user interface pointers usability.gov

Keep the interface simple
Create consistency and use common UI elements
Have a purposeful layout
Use colour and texture strategically
Use typography to create hierarchy and clarity
Have the system communicate what is happening
Make use of defaults

Abras, Maloney-Krichmar and Preece (2004) wrote an article on User-Centered design. They talk about the importance of developing a proper UI and how it can cause sale losses and damages of the company’s image. Offer four basic principles each design should have. In Table 5: four basic design principles according to Abras, Maloney-Krichmar and Preece these principles are shown.

Table 5: four basic design principles according to Abras, Maloney-Krichmar and Preece

Make it easy to determine what actions are possible at any moment.
Make things visible, including the conceptual model of the system, the alternative actions, and the results of actions.
Make it easy to evaluate the current state of the system.
Follow natural mappings between intentions and the required actions; between actions and the resulting effect; and between the information that is visible and the interpretation of the system state.

Schnall et al. (2016) have written an article about UI design, specifically focussing on mHealth. Which is, of course, very topical for this thesis. They made several prototype applications and did user tests to gather data on which design was most effective. In their

findings several design elements came forward. In Table 6: found design elements according to Schnall et al. these design elements are visualized.

Table 6: found design elements according to Schnall et al.

Visibility of which status the application is in
Match between how the system works and how the real world works
The user wants to have freedom and be in control
Consistency and standards
Help users recognize, diagnose, and recover from errors
Error prevention
Let the user recognize rather than recall
Flexibility and efficiency of use
Aesthetic and minimalistic design
Have help and documentation available

Heitkötter, Hanschke and Majchrzak (2013) focus on multiplatform design in their article. They talk about how the design should feel “native” or in line with the OS of the system you’re developing for. Next, they stretch how important speed is, the start-up and response time should be fast, so that the user doesn’t wonder if something went wrong. Lastly the developer should keep longterm usage in mind. An example of this would be that the system remembers the user’s previous input so that he doesn’t have to spend as much time when using the system repeatedly.

3.2.2 MoSCoW method

The MoSCoW technique is a method developed by Dai Clegg. It is a technique that is used for requirement prioritization. The word MoSCoW is meant to be an anagram for its four categories: Must have, Should have, Could have and Would have. Where Must have has the highest priority and Would have the lowest. Eduardo Miranda (2011) defines the categories as followed:

- Must Have: Those features that the project, short of a calamity, would be able to deliver within the defined time box
- Should Have: Those features that have a fair chance of being delivered within the defined time box
- Could Have: Those features that the project could deliver within the defined time box if everything went extraordinarily well, i.e. if there were no hiccups in the development of requirements assigned to higher priority categories
- Would have: features, those for which there is not enough budget to develop them

The MoSCoW technique is widely used to approach a common stand with stakeholders. MoSCoW analysis shows priority on the significance, stakeholders place on the carriage of each requirement (Sydeek, 2017). Sydeek approached the MoSCoW method not by time, but by delivery significance. The MUST categories here stands for Minimal Useable SubseT. Meaning the absolute minimal requirements to bring a product on the market. SHOULD is described as essential but not crucial. However, it is pointed out that without the requirements in SHOULD the business will take on a whole other view point, so it is best to not be left out.

COULD are desirable features, but don't have a great impact on the results if left out. Lastly WON'T are the least crucial requirements for the upcoming delivery and will therefore be left out completely or moved to a later version. The main reason for the effectiveness of MoSCoW is the fact that everyone working in the business contributes to the priority making decisions. While it is quick and easy to complete, the major advantage is that a certain percentage of resources can be allotted to each of the four haves. It gives prioritization in a quick and instinctive way.

Chapter 4: Ideation

4.1 Back end software

4.1.1 Swift/objective-C

Objective-C is the programming language that Apple brought out in 1986, based on the language C. Objective-C is now mostly used to program for Mac OS X or iOS. The successor of objective-C is called Swift. Swift was developed to make programming more accessible for people with little to no programming experience. Swift can be used to program for iOS, macOS, watchOS, tvOS, Linux, and z/OS. It uses the Cacao and Cacao Touch frameworks. Swift can be used with xCode as it's IDE (integrated development environment).

To learn Swift there are a lot on online (free) tutorials on the market. On the Swift website there is a very basic tutorial, which does go really in depth on the different concepts that people that have no programming experience might not know. They also provide more in-depth tutorials to learn specific skills.

Personally, having experience with JavaScript, C, C++ and C#, I found picking up swift not that hard. It is very intuitive and already has a lot on inbuilt features. There are also a lot of libraries available that might be useful for this project.

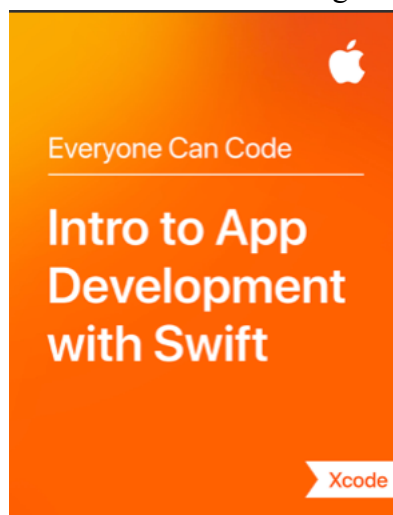


Figure 7: Book cover for introduction into Apple's Swift

4.1.2 SQLite

SQLite is a relational database managing system (RDMS) in the form of a library for C, which makes it appropriate to use when programming in Swift. SQLite is an extension of SQL (Structured Query Language), which is one of the most used RDMS'. With SQL you can create databases and put data into that database. SQLite will be appropriate for the application idea, so that recipes can be neatly stored into a database, which makes it easy to work with.

Again, with SQLite, there is a lot of documentation to get a grasp on the library, making it easy to learn, and easy to implement. It should be noted that before implementing SQLite, there should be a clear scheme on how the database will be used and what the columns and rows should entail.

4.1.3 OCR for swift (Tesseract)

OCR stands for optical text recognition. As the name suggests it is a tool that can recognize text from a picture. This text can be written, printed or machine encoded. In this project OCR could be used for the recognition of recipes. The challenge here lies in separating the different components of a recipe, such as title, ingredients and method.

In Swift, there is a library called Tesseract. Tesseract is, as of now, the most accurate OCR library available for Swift. It is quite well documented. Yet this is one of the more complex features that will be implemented into this project. Therefore, it should be more researched before implementation.

4.1.4 Proto.io

Proto.io is a web-based tool brought on the market in 2011 to help create prototypes for mobile applications. Over all it is considered to be one of the best tools to develop realistic prototypes for mobile applications with regards to functionality as well as design. (Pattichi, 2012). In its functionalities you can simulate such interactivities as: clicks, taps, tap and holds, as well as swipes. Additionally, transitions such as slides, pops, fades and flips are also supported to make the prototype resemble the real experience more closely. (Piperides, 2011). In this project Proto.io will be used to create a prototype for a mobile application that can be used to do user tests based on the requirements.

4.2 Requirements

In this chapter the requirements for both the prototype and final product will be written down and characterized.

4.2.1 Requirements for final product

In chapters 2 and 3 several requirements have been expressed. In this subchapter these requirements will be discussed. The first requirements for project is that it should be a mobile application for Apple's iOS operating system. Preferably also an application for Google's Android OS. The application should be in Dutch, as this best accompanies the target demographic. The application should have three main functionalities. First, a list of recipes. The user should be able to navigate through this list as well as modify the list. They should also be able to modify the recipes in the list, for example the serving size or swap ingredients. The user should be able to add their own recipes from different media, such as a picture or a web-link. The recipes added should be added to a database. The recipes should be able to be categorized.

The second functionality should be a meal plan. This could be daily, weekly or monthly. Users should be able to add their recipes from the aforementioned recipe list and should be able to retrieve previous meal plans. The last functionality would be to have a grocery list. This grocery list should be automatically generated based on the meal plan created. The user should be able to change, add to and remove ingredients manually from the list.

Besides the requirements in functionalities, the app should be easy to navigate for the target demographic and have a pleasant design. It would be preferable to use the client's diet as a base to inform users through the application about how to make the right choices with regards to their diet.

4.2.2 MoSCoW table for final product

In chapter 3.2.2 the concept of the MoSCoW technique is explained. In this chapter, the requirements that came forward will be categorized using this technique.

Table 7: MOSCOW table

MOSCOW table	
Must	Should
<ul style="list-style-type: none"> • App • Database • UI • Add recipes as user 	<ul style="list-style-type: none"> • Change recipe size • Use/upload pictures as indicators • Recipe template • Tags • Focus on lunch and breakfast • Meal plan • Grocery list
Could	Would
<ul style="list-style-type: none"> • Change app to website/website to app • Implement add-ons • Grocery list generator • Rating 	<ul style="list-style-type: none"> • Grocery categories

In the MUST category are the very basic requirements to have a working application with a purpose. As mentioned previously, the application will have three main functions. The most important and extended function is for the user to add their own recipes. Therefore this goes in the MUST category. In SHOULD add-ons to the recipe binder are found. Such that the application can be used as is, or with the could category included. In SHOULD the other two main features are also found. In COULD there are the least important features for the app to work and be effective, though it would be nice to have those. Lastly in WOULD there are grocery categories. It has been decided that this feature is not essential for the app to work as intended.

4.2.3 Sketches of requirements

Based on the requirements mentioned above, physical sketches have been made about what the application should look like and some basic functionalities.

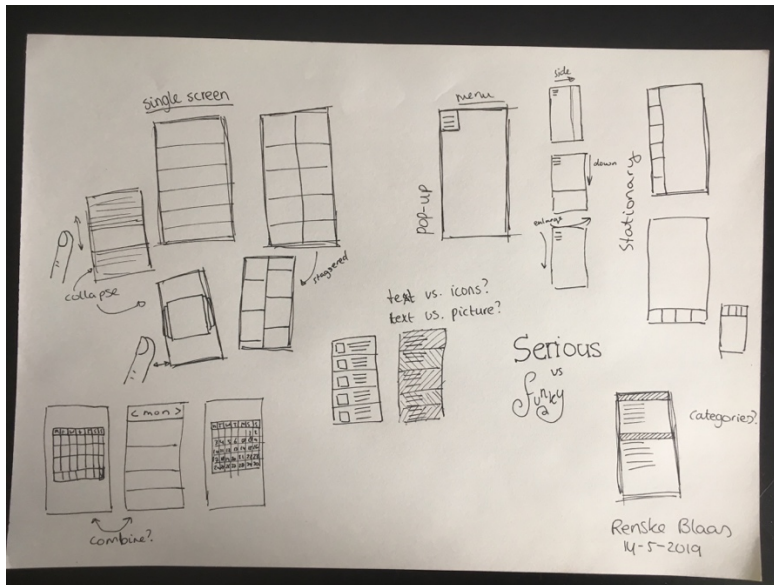


Figure 8: initial sketches

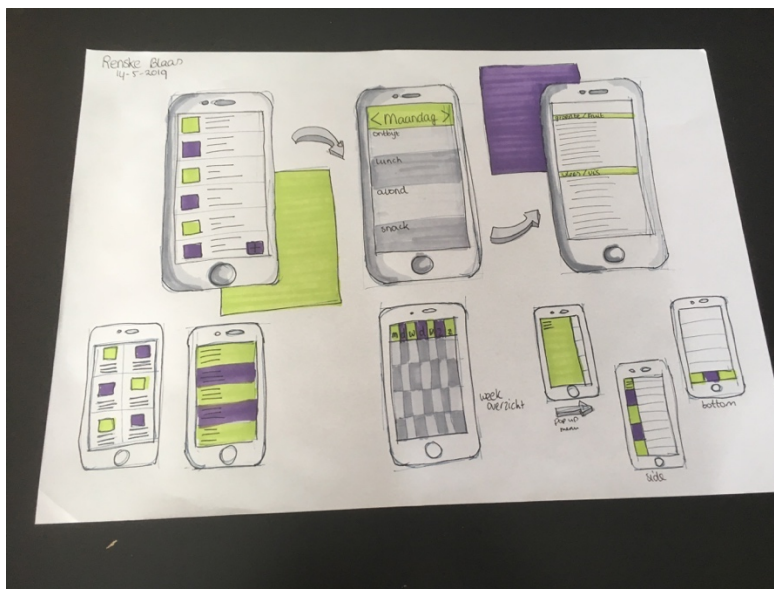


Figure 9: more detailed sketches

4.2.4 Unique value

There are a lot of applications similar to the one proposed in this project. However, there are some aspects that make this project unique.

- The design and functionalities of the application are approached from an academic view point, rather than a commercial view point
- The app is specifically tailored towards women between ages 40 and 60, rather than a wider audience.
- In the app the teachings and philosophy of the Willieanne.nl company will be represented.

4.2.5 Requirements for prototype

Before any final product can be developed it goes through a series of prototypes. The first prototype for this project will be used for user tests. In this chapter the most important requirements that the prototype must have, are described. These requirements are:

- A clear representation of the three main functionalities: Recipe list, Meal plan and grocery list
- Some interactivity between the three screens
- A representation of the different screens that can be used in the application
 - o Look at recipes and get information about them
 - o Add new recipes
 - o Add recipe ingredients to grocery list
- A clear representation of what the design of the application will look like.

Chapter 5: Specification

5.1 Creating a survey

5.1.1 Theoretical background

In the first survey on design of the application there are three things that need to come forward. First, some characteristics of the person filling in the survey; how integrated is technology (e.g. a mobile phone) into their lifestyle? This is important to know so that possible outliers can be spotted and kept into consideration. These questions will be asked on a 5 point, Likert scale. The Likert scale was chosen so that a subject might express the strength of their opinion as well as give a neutral answer, without given them too many choices, possible making the survey difficult to fill out. Secondly there should be information gathered on the design of the interface. These questions will be based on the basic principles of UI design discussed in chapter 3.2.1.3. The questions will be posed by providing two pictures of possible designs and the person filling in the survey should choose which one appeals to them more, there will also be an option to pick neither, this A or B structure is chosen for this segment so that there is a clear indication of which design elements are better. Thirdly there will be questions on the functionality of the application. These questions will be posed in the form of: I would use an app with functionality X: strongly agree, agree, neutral, disagree, strongly disagree. The Likert Scale is chosen here again for the subject to have several options without being overwhelmed. Besides these three elements there will be a fourth part asking the participant whether they have extra comments. The survey will be conveyed in Dutch as the application will also be in Dutch and it is an easily accessible group. The Dutch translation of the survey can be found in appendix A.

5.1.2 Format

Informed consent

In this survey you will anonymously answer questions about the design and functionalities of a hypothetical mobile application about meal planning and management. To get an image of what possible consumers might value in such an application. This is a voluntary survey. The data collected will not be distributed on other channels.

1. I understand the subject and purpose of this survey
2. I understand that this survey is voluntary
3. I understand that the data from this survey will not be distributed
4. I understand that this is an anonymous survey

Part 1: Introduction

In the coming two months, a prototype for a mobile application will be developed that will help the users plan and manage their meals. The idea is that it will digitalize processes that most people already use in their routine. The target group for this application will be women between the ages of 40 and 60. This target group has been established because this age group often deals with inconveniences such as lower energy and several kinds of pain, because of

the changes their bodies are going through. Proper diet has been shown to greatly improve these inconveniences. This mobile application is meant to make sticking to a proper diet more manageable, by using proper planning techniques. In this first part you will answer some general questions about meal management and planning.

1. Would you be interested in an app described in the introduction of this survey?
2. What is your age?
3. Do you use any of the following tools to help you plan your meals?
 - Agenda, grocery list, print outs, recipe book, recipe binder, calorie tracker, (mobile phone) camera, other
4. How often do you use a mobile tool when using the previously mentioned tool?
5. Do you like mobile alternatives better than their paper counterparts?
6. How comfortable are you with a mobile phone?

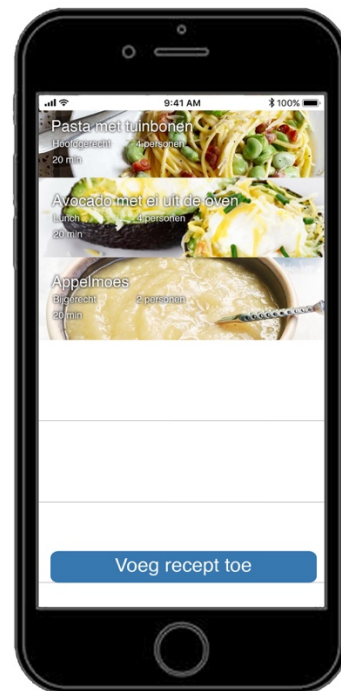
Part 2: Design

Design is an important part of app development. In this segment, questions are asked on what your design preferences are. With each question two designs are shown. You should choose the option you like most, or state that you don't have a preference.

1. Clean and simple interface



A



B

2. Intuitive vs counter intuitive components



A



B

3. Layout

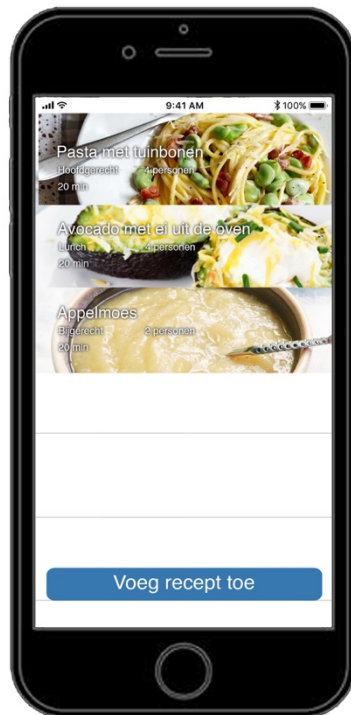


A

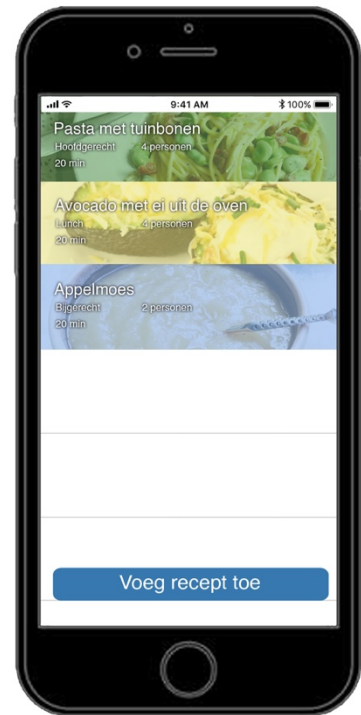


B

4. Colour

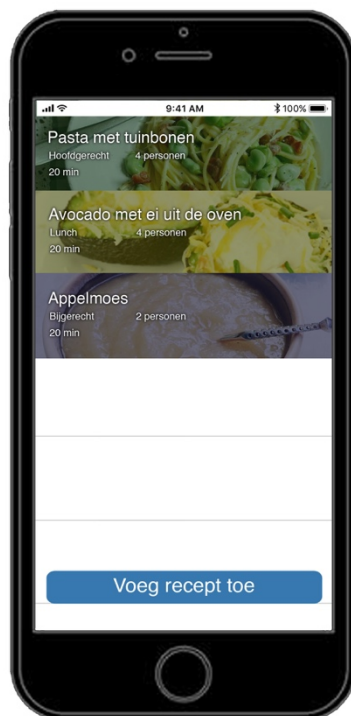


A



B

5. Texture

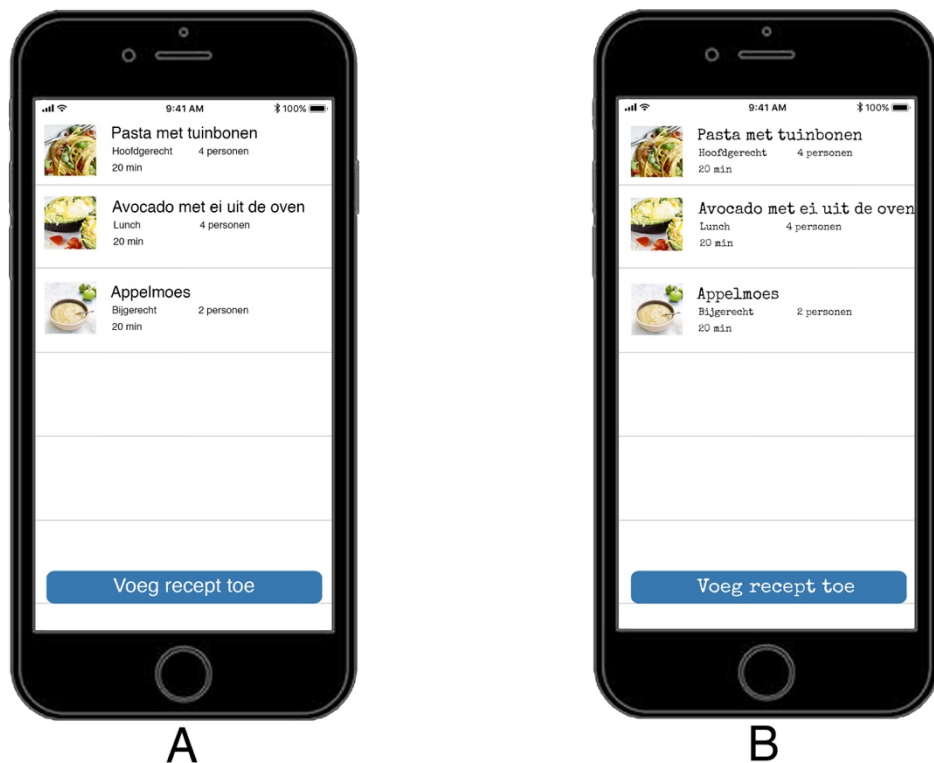


A



B

6. Typeface/font



Part 3: Functionality

In this section several possibilities for functionalities will be explained. You can answer how likely it is that you will use each feature.

1. Combining recipes from picture
2. Combining recipes from picture that are automatically sorted and ordered
3. Daily meal plan
4. Weekly meal plan
5. Monthly meal plan
6. Shopping list
7. Automatically generated shopping list based on recipes
8. Automatically generated shopping list based on staple items you buy that might have run out
9. Automatically generated shopping list that gives you recommendations based on what you still have
10. Which feature(s) are you most interested in?
 - a. Combining recipes
 - b. Sorting and ordering of recipes
 - c. Daily meal plan
 - d. Weekly meal plan
 - e. Monthly meal plan
 - f. Shopping list

- g. Automatically generated shopping list
 - h. Recommendations of what you might need to put on your grocery list
11. Are there any features that weren't mentioned before, but that you'd like to see?

Part 4: Closing

1. Do you have anything to add?

Thank you for filling out this survey!

5.2 Survey results

The survey was sent to mothers of peer students, who in turn were asked to share the survey among their friends and family. The survey was also sent to the client who put a link in her newsletter and sent a message in a Whatsapp group with her clients. After being on line for two weeks the survey was closed with 68 responses. This amount of responses will be considered as sufficient to recognize the results as representative.

5.2.1 Projected target group

The first thing that is noticeable is that 93.6% (64) of the participants were between the ages 30 and 60 years. On top of that 82.5% (57) are within the aimed target group of ages 40 and 60. Because of this, only the participants between ages 40 and 60 will be considered in the rest of the results.

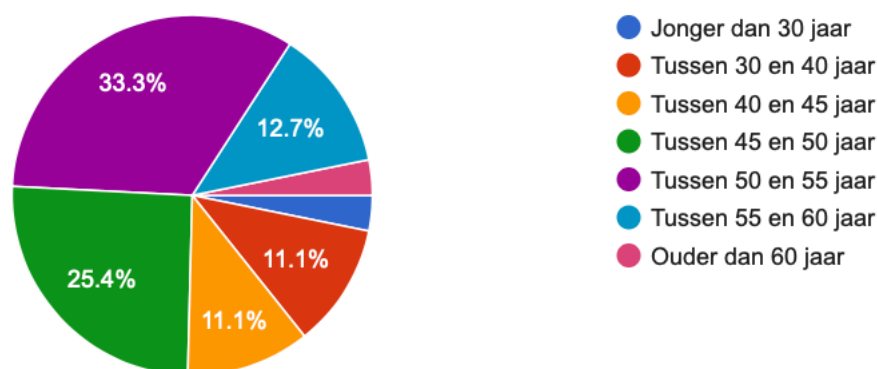


Figure 10: Age of participants of survey

5.2.2 Technology integration and interest

In the first section of the survey questions were asked about how comfortable the participants feel with regards to technology as well as how interested they are in the concept of meal management in combination with smart devices.

If we look at the interest for the application in Figure 11: Chart of interest in mobile application, it is clear that over half of the participant express great or mild interest into the idea of a meal management application. This is according to our hypothesis also the case.

Interest in application as proposed

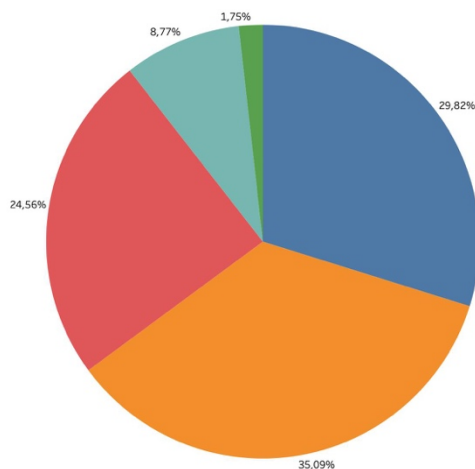
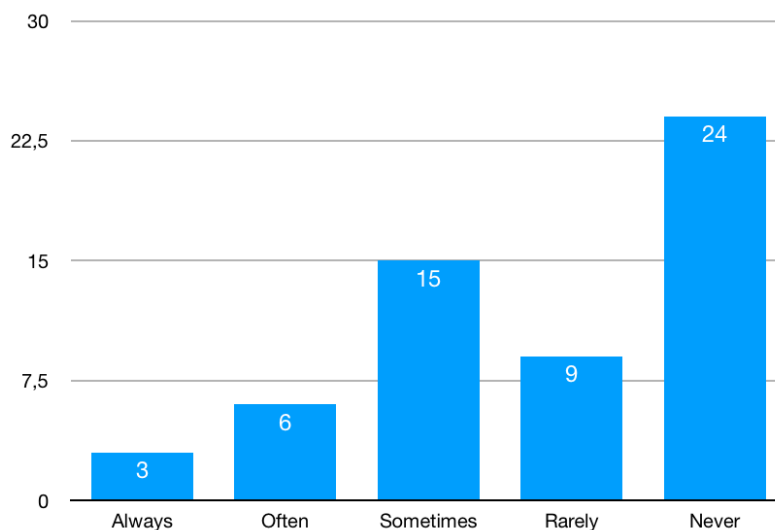


Figure 11: Chart of interest in mobile application

Secondly, 52 out of 57 (91.1%) participants say that they use some kind of tool to manage their meals already. Most prevalently are: a grocery list (71.9%), a binder with recipes (42.1%), a cookbook (31.6%), printed recipes (35.1%) and something that keeps track of calories or a food group (22.8%). In this question there was also an option to add other tools. The most interesting other tools that came up are: meal boxes and applications to order groceries, such as Appie/Albert Heijn, Jumbo app or Picnic app.



The participants were asked how often they use apps instead of paper with these tools. 24 participants (42.1%) expressed that they never use technology to help with meal management (see Figure 12: How often do you use an application to help meal management?). This is conforming the expectation that technology is quite rarely used in meal management among the target demographic. Interestingly enough, do most participants express that they are comfortable with the use of smartphones (see Figure 13: How comfortable are you with a mobile phone?). 42 participants (73.7%) expressed to be comfortable with the use of smartphones and 16 participants (28.1%) even express to use their smartphone every day.

While only 1 participant (1.8%) expressed that they never use a smartphone. This statistic is interesting, because it was expected that the graph would be skewed more to the right, having a peak around neutral. This outcome might mean that the target demographic is underestimated, or that they overestimated themselves. A definite conclusion cannot be made about this.

Figure 12: How often do you use an application to help meal management?

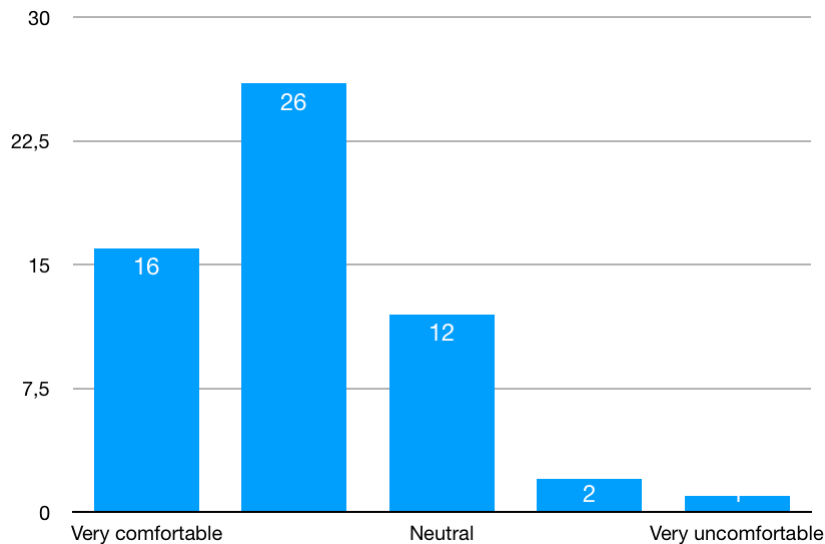


Figure 13: How comfortable are you with a mobile phone?

5.2.3 Design preferences

In the second part of the survey, questions were asked about designs based on sketches from one of the previous questions. What was very noteworthy about the responses was that every comparison there was an obvious majority (at least 67%) for one of the designs. As the survey was designed that every comparison was based on the question before, it is very apparent what the preferred design is.

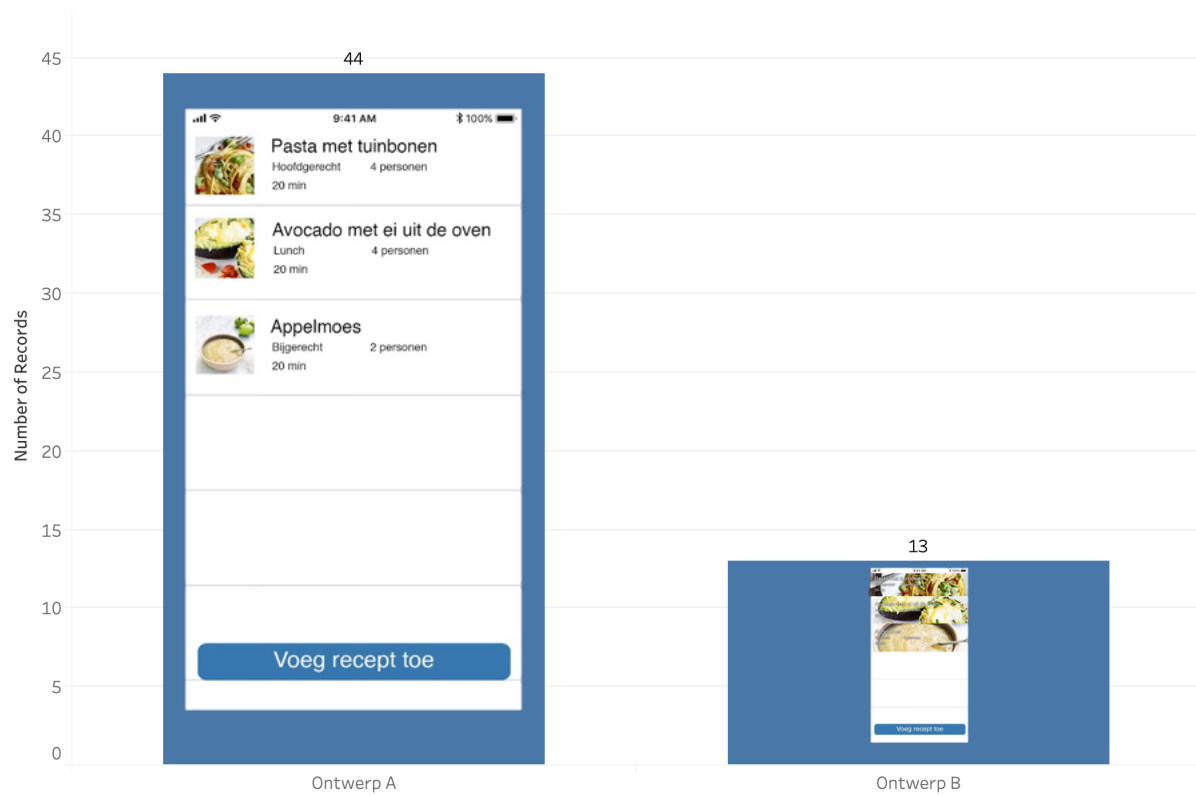


Figure 14: Do you prefer a more simple or extensive design?

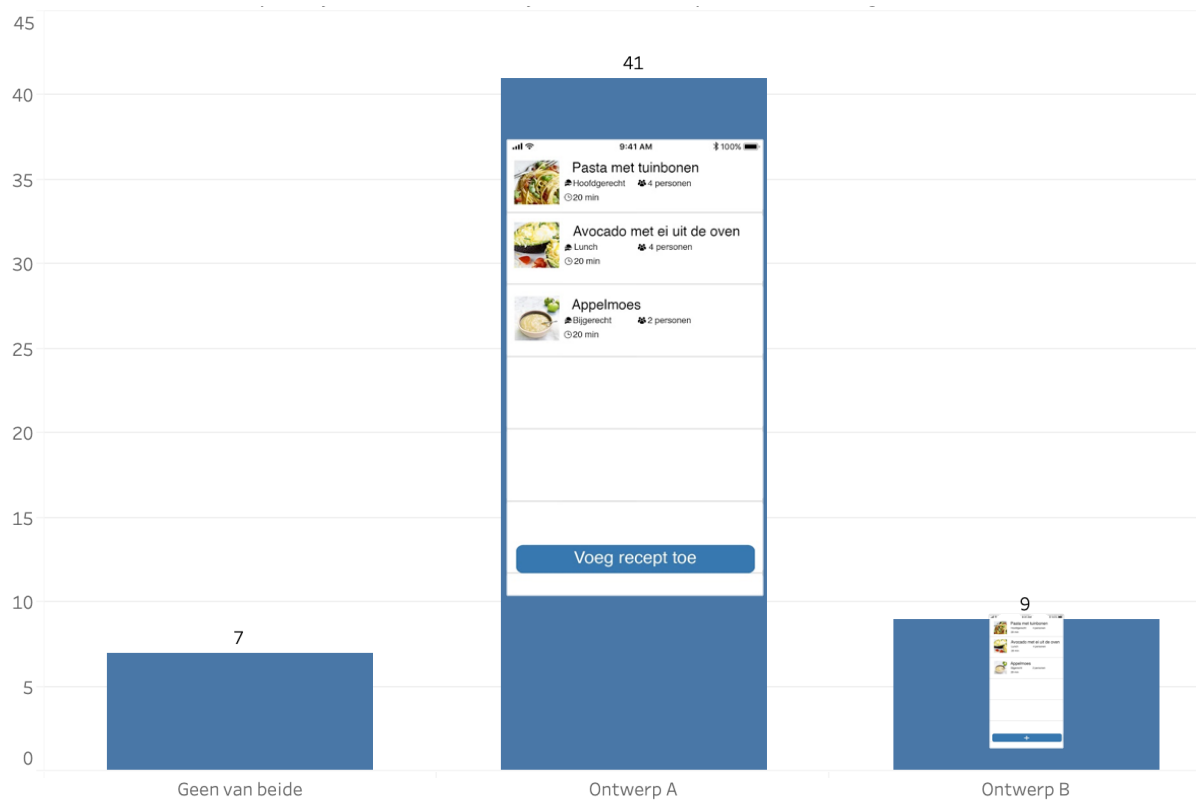


Figure 15: Do you prefer more or less information on the screen?

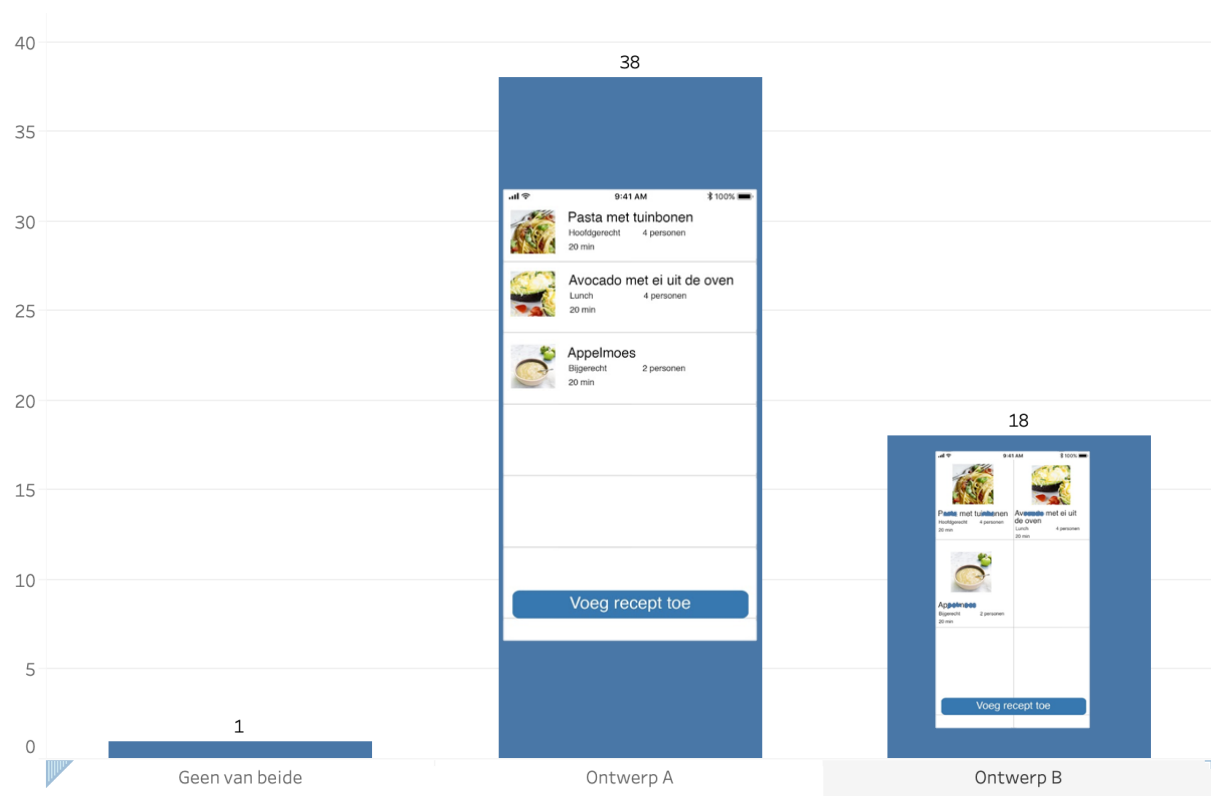


Figure 16: Do you prefer a more organized or dynamic lay-out?



Figure 17: Do you prefer more colour or more monochrome?

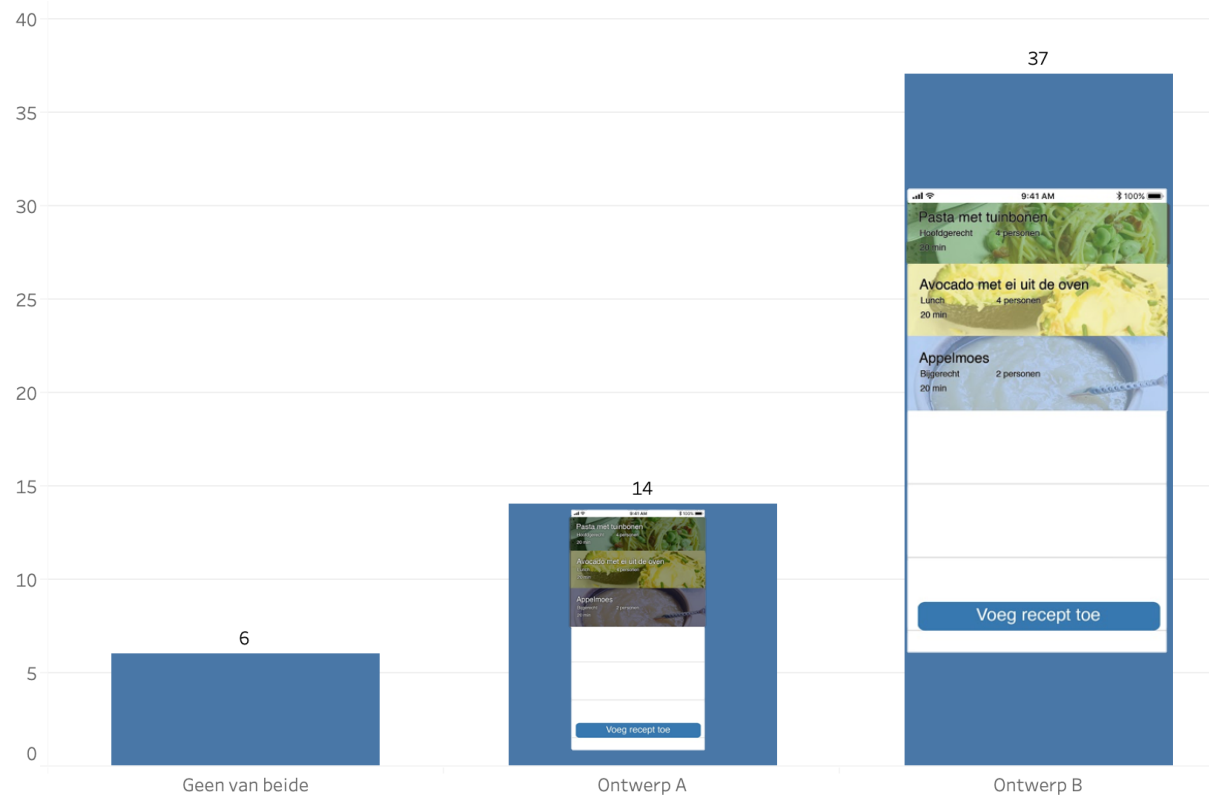


Figure 18: Do you prefer light or dark colours?



Figure 19: Do you prefer a basic or playful font?

5.2.4 Functionality preferences

In the last part of the survey questions were asked about possible functionalities for the application. All questions had a strong trend towards either a great interest or barely any interest. Below the outcomes are summarized:

- App that stores pictures of recipes: Great interest
- App that stores pictures of recipes and automatically organizes them: Great interest
- Daily meal plan: Great interest
- Weekly meal plan: Great interest
- Monthly meal plan: Barely any interest
- App where you can make a grocery list: moderate interest
- App that makes grocery list based on recipe: moderate interest
- App that makes grocery list based on what you normally buy: moderate interest.
- App that makes grocery list based on what it detects you still have: divided interest.

After these questions the participants were asked which functionalities they would most likely use and whether they would like any other functionalities. By far most people were interested in a weekly meal plan functionality (see Figure 20: Interest in functionalities). Other popular functionalities were: An app that orders and sorts recipes for you and an app where you can collect recipes. When asked if the participants were interested in any other functions a couple of ideas came forward. Several participants expressed interest in keeping track of calories and macro nutrients (protein, carbohydrates, etc.). Another functionality that came up was to search for ingredients within recipes. Lastly there were several requests to include information in the application about healthy and environmentally friendly diets, such as vegetarianism and the Dutch “Schijf van vijf”.

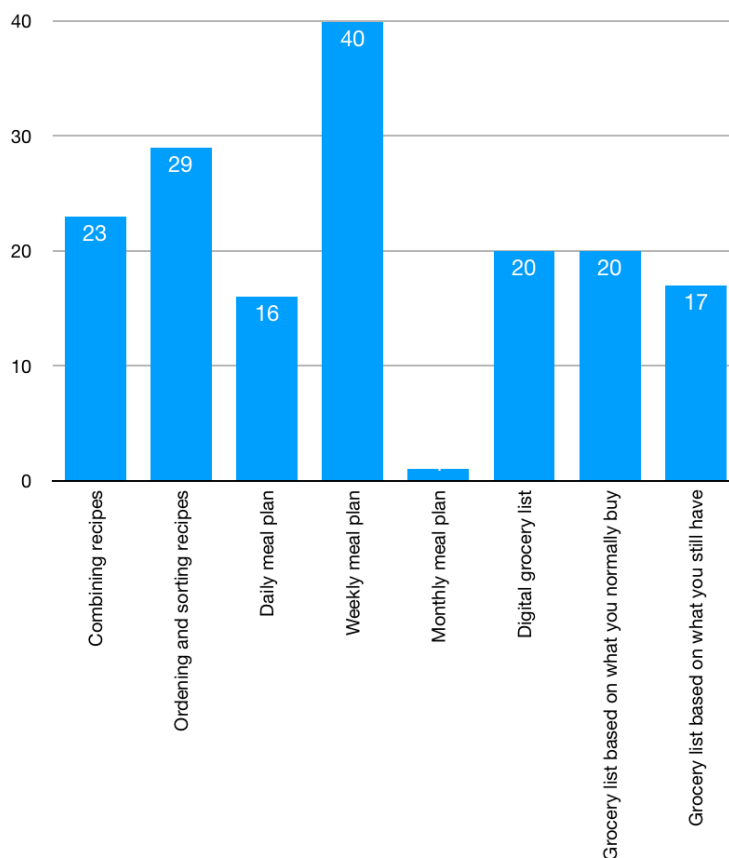


Figure 20: Interest in functionalities

5.3 Development of prototype

To develop the prototype, Proto.io was used. In this chapter the design and interactivities of the prototype are visualized. Design choices and interactivities will be explained in this chapter.

5.3.1 Recipe tab

The recipe tab is the main tab and the one that the user sees when opening the application. In the recipe tab the user can scroll to pre-set recipes, use the search bar, add recipes and click on the recipe for more information. The aesthetic is based on the results from the survey. When the user clicks on the “add recipe” button it will lead them to a pop-up where he can give the recipe a title and category and upload a photo of the recipe. Then the user can press “done” and either save or discard the recipe. The state is returned to the recipe browser. If the user clicks on the recipe a pop up appears as well. Here the user can see a photo of the recipe, some information like preparation time and serving size. Beneath that a list of ingredients and the instruction. There is also a button where the user can click to find extra information about the recipe, such as nutrients or suggestions for what to pair the recipe with.

5.3.2 Meal plan tab

The meal plan tab has been kept very simple. The user can scroll up and down. The meal plan is divided by green bars that indicate the date. For each date the user can fill out their breakfast, lunch, dinner and snack from a dropdown. Because of the layout the user can choose himself how many days he fills out at a time.

5.3.3 Grocery list tab

Lastly, the grocery list tab. Here a simple checklist is shown where the user can tick which items, he already has. There is also a function to empty the grocery list with the “empty grocery list” button.

5.3.4 Interactivity

In this prototype there is also some interactivity between tabs. Firstly, if you look at a recipe in the recipe tab, there is a button to add the ingredients to your grocery list. Once pressed the ingredients can be found there and removed when done. Secondly, in the meal plan tab, the drop-down menu to pick recipes is linked to the recipe tab. Lastly, there is an option to swipe left and right on the bottom of the screen to switch between tabs.

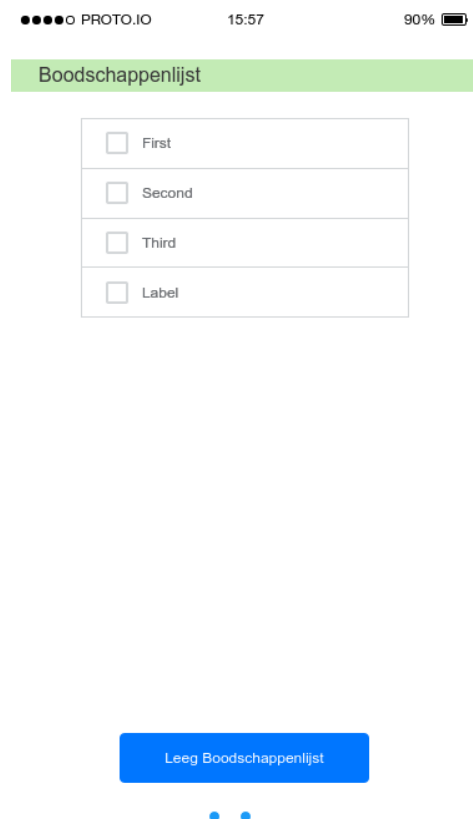


Figure 22: Grocery list

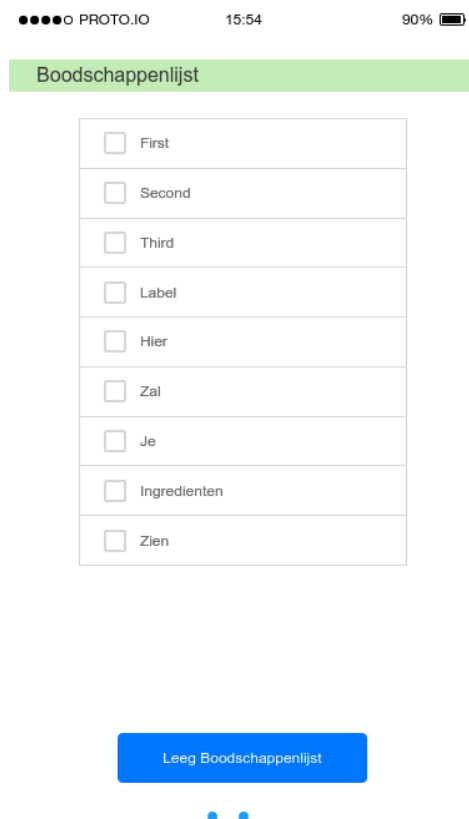


Figure 21: Grocery list once ingredients from recipe are added

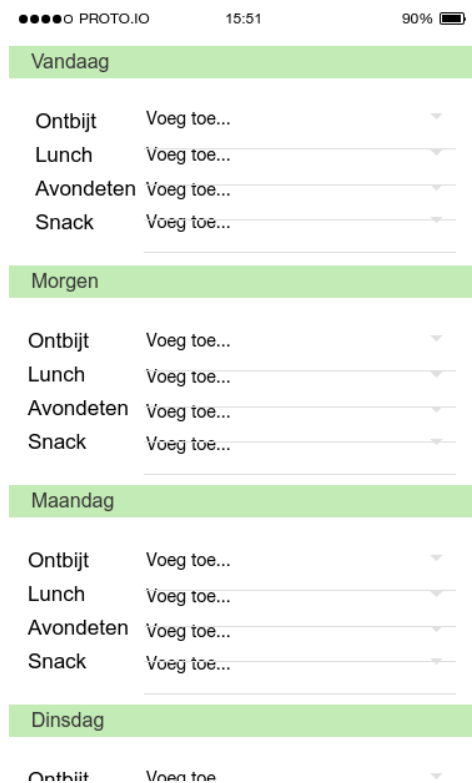


Figure 24: Meal plan

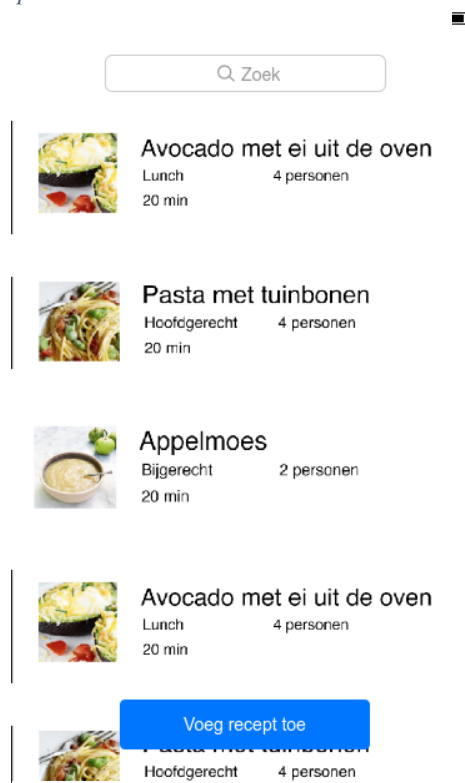


Figure 23: Recipe list



Figure 26: Add new recipe



Figure 25: Save or discard recipe

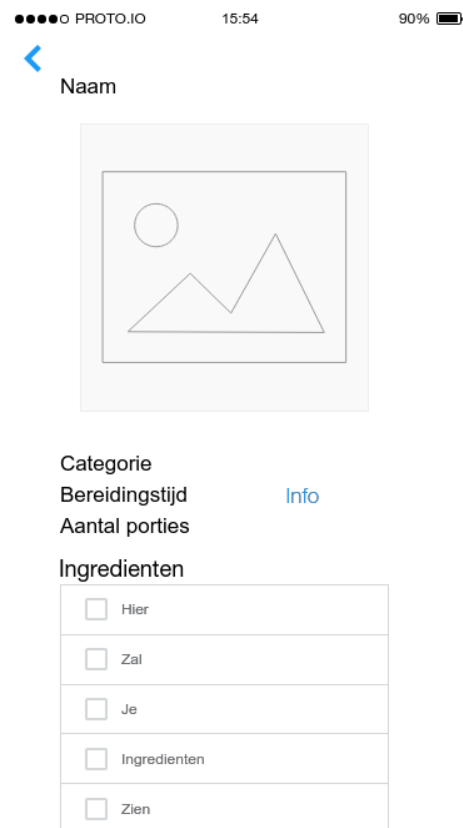


Figure 28: View recipe



Figure 27: View info from recipe

Chapter 6: Realization

6.1 User test design

User tests will be done based on the prototype that was developed in chapter 5: specification. These user tests have as goal to find out whether the requirements are met as well as to test the design elements that were applied. The participants of the user test will be chosen based on people that fit the target group, Dutch women between the ages 40 and 60, within my personal circle (i.e. family and friends). The test will take about 30 minutes and will consist of one participant at the time. Beforehand an information sheet about the research will be provided and a consent form will be signed. These documents can be found in the Appendix C. The test is built up out of three separate parts. First, the participants will blindly test the app, they will be allowed ten minutes to play with the app, figure out all the functionality and give their initial opinion and feedback. Second, there will be a segment of about 10 minutes, where the participant is asked to perform three specific tasks:

- To add a recipe by taking a picture of it.
- To look for extra information added to the existing recipes
- To add ingredients from a recipe to the grocery list

After each task the participant is asked about the difficulty and clarity of the task. The third segment will consist of a guided discussion, where the participant can give their final opinion on the prototype. Questions that are important here are: What did you like about the app? What didn't you like about the app? What was easy to find? What was difficult to find? Would you use this app yourself?

6.2 User test results

User tests have been done to test the requirements and applied design elements of the prototype that was developed. The test consisted of five people from the target group as well as feedback from the client. This is a sufficient number of participants for this test, because this task is not focussed on statistics, but rather on reactions. Keeping the number of participants low allows for more qualitative data rather than quantitative. In this chapter the results of the test are reviewed.

6.2.1 Part 1: Blind test

In the first part participants were given 10 minutes to use the prototype and explore its features. During this part the participants were encouraged to share their initial opinion openly. In this sub-chapter a summary is given of the points that were brought up.

Several participants expressed that as they aged they noticed that the use of a touch screen had become more difficult as their fingertips have lost some texture over the years. This led to several flaws were pointing out regarding this. For example, the “add recipe button” was too small for some, meaning they couldn't access the next screen. In the prototype it was also only possible to swipe left and right on a small portion at the bottom of the screen. All participants pointed out that they were missing some kind of conformation when pressing buttons. This was mostly the case for adding recipes from a recipe. The participants thought that the design was very clear and aesthetically pleasing. One participant expressed that it was nice that there is a clear division between the recipe tab and the meal plan tab. Lastly the participants talked about some features that they would like to see. These features include: To have the option to add recipe ingredients straight from the meal plan tab, to add a recipe by uploading a link, to be able to customize recipes.

6.2.2 Part 2: Specific tasks

In the second part of the user test, participants were asked to perform three specific tasks. In this part it was important to notice whether the participant could complete the task as well as with what ease they could complete it. Therefore, after each task the participants were asked to express their opinion about the difficulty of the task. In Table 8: Completion of tasks the results of this part of the test are noted

Table 8: Completion of tasks

Task	Difficulty	Note
Add a recipe with picture	Very easy	-
Search for extra information that comes with a recipe	Easy	One participant expressed this is probably because she did not get distracted but pictures or other information as it were all placeholders.
Add ingredients from a recipe onto the grocery list, then check if they succeeded	Easy	Participants missed the conformation, so they were unsure whether they succeeded

6.2.3 Part 3: Guided discussion

Lastly there was room for a guided discussion. This meant that the participant was asked again about their opinion of the app and the interviewer would ask questions based on the opinions given. The participants thought that it is an elegant application that is easy to navigate. Some expressed that they could really notice that the app was made with them as target group in mind. All of the participants understood how all the functions worked after having played with it in the first part of the test. Some concerns were raised about the nutritional value of the recipes (macronutrients) as well as how drinks would come into play within the app. Lastly, it was concluded by several participants that if they were given this app they would still have difficulty with maintaining a proper diet, however, those participants did say that receiving proper education from a dietitian would solve this problem and then it would be a useful tool.

6.3 Re-iterations based on user test (Second prototype)

Based on the results of the user test several changes were made. These changes are shown in Table 9: Changes made for second prototype. Screen shots of the second prototype are shown below.

Add actual information, such as a picture and the actual information and ingredients
Make the swipe function easier to use
Add a function that allows users to add ingredients straight from meal plan
Let user add own information in information pop up
Show a feedback pop-up when adding ingredients
Add the recipe interface

Table 9: Changes made for second prototype



Figure 30: Recipe tab/main screen

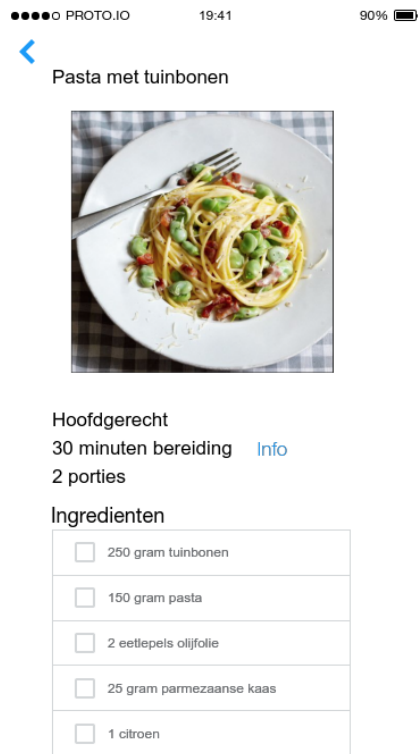


Figure 29: singular recipe



Figure 32: Extra information with recipe

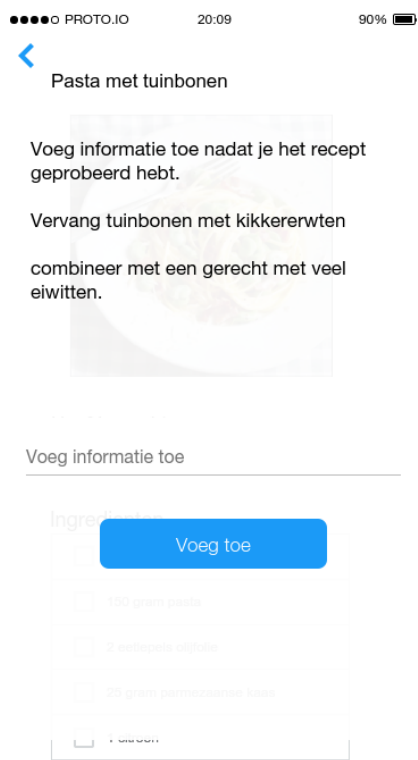


Figure 31: Add your own information



Figure 36: add new recipe

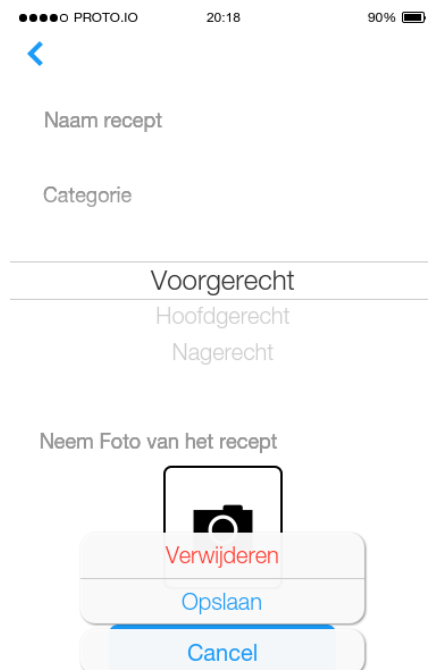


Figure 35: add new recipe; save or discard

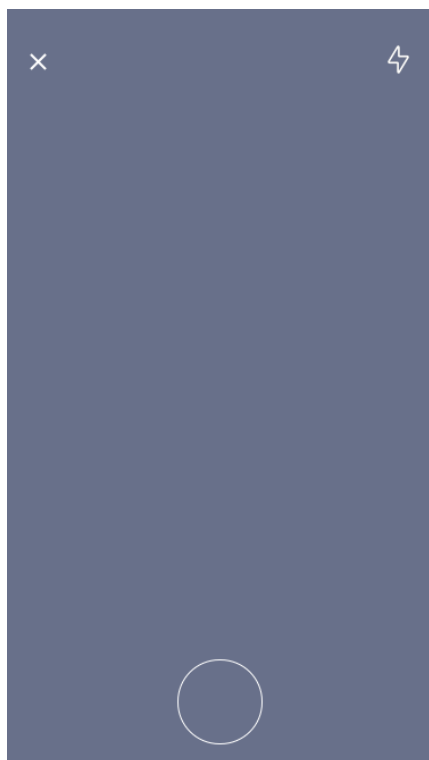


Figure 34: camera screen

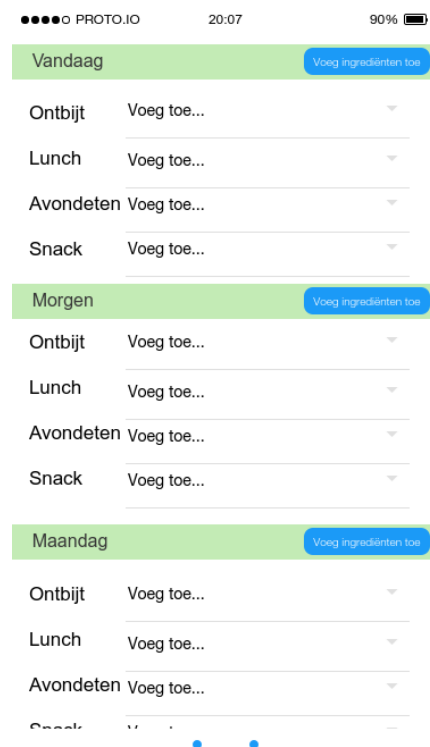


Figure 33: meal plan

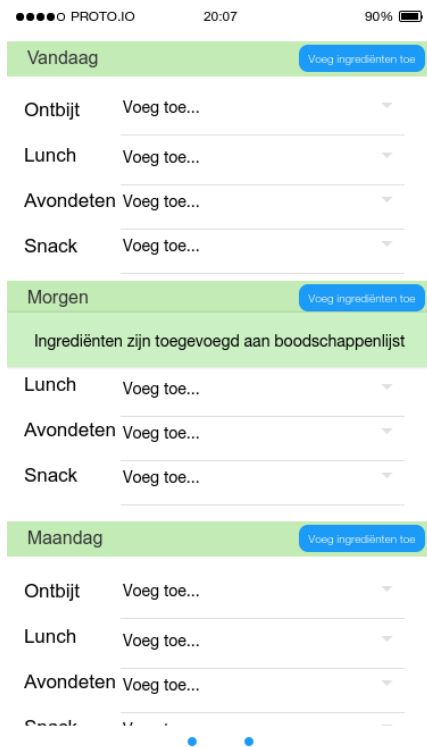


Figure 38: meal plan when ingredients added

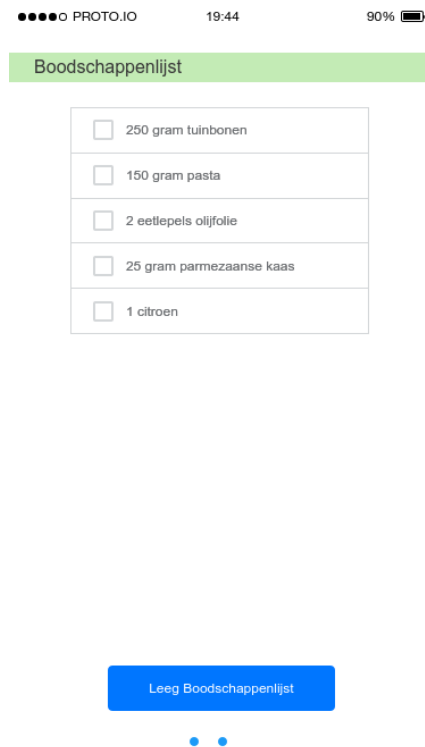


Figure 39: grocery list

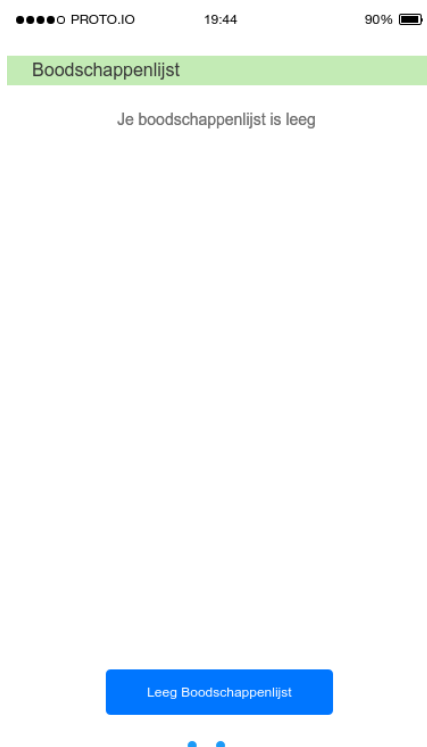


Figure 37: Empty grocery list

6.4 Technical framework

6.4.1 SQLite framework

The SQLite library is used in this project to easily store, retrieve and edit recipes that were input from the end-user. When working with SQL it is important to have a clear overview of how the tables will be divided and what attributes are needed. In this chapter the structure and execution of the tables will be explained.

6.4.1.1 Table schema

The most logical and clean solution to order recipes is to use three tables. First a table that categorizes recipes. This table contains the names and ID tags (as primary key) of different categories, for example breakfast, lunch, dinner. Unique ID tags are used to make sure that there are no two categories with the same name that could crash the system. There is a category table so that it will be easy for the end-user to search through recipes based on their needs and wants. Second there is the table for the recipe itself. This recipe table has a recipe ID as a primary key and a category ID as a foreign key referring to the category table. Furthermore, different attributes might also be columns in the recipe table. These attributes will be: Name (string) , Introduction (string), Image (string), Preparation Time (string), Amount of Servings (string) , Favorite (boolean). Lastly there is a ingredients table, which has an ID as primary key and a recipe-ID as foreign key that links to the recipe table. Further attributes will include the name (string), quantity (float) and unit (string). Using this structure might give opportunity to change the serving size as well as the unit conversion.

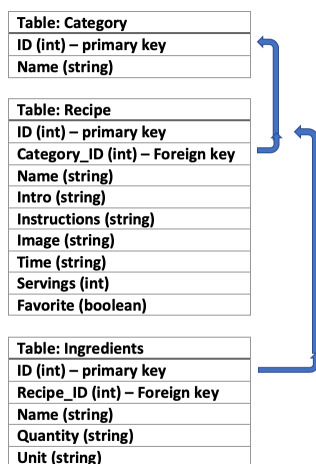


Figure 40: Table of SQL tables

Chapter 7: Evaluation

7.1 Evaluation of state of the art

In chapter 2: State of the art possible directions were discussed as well as which similar products are already on the market. These possible directions were quite extensive, but from the beginning it was already clear in which direction the project was heading. Namely the mobile application prototype. Because of this the similar products could have been researched more extensively. Furthermore, the preliminary requirements were introduced. These preliminary requirements gave a good indication on how to proceed with the product. They have not changed much further along the line.

7.2 Evaluation of methods and techniques

In chapter 3: Methods and techniques, several methods were explained. In this chapter several techniques on project management and project design were described. These techniques were really useful to keep structure in such a large project. Also, basic user interface design principles were explained and compared. These were used to create several templates for the survey and in turn the prototype.

7.3 Evaluation of ideation

In chapter 4: realization, the requirements are expanded upon, as well as recommendations for the back-end software were made. Within the project not all of them were used. Specifically, the Apple Swift software was not used in making the prototype as it was chosen to use an emulator instead of a fully functioning application, because of time constraints. Even though these techniques were not used in this project, I would still recommend using these techniques, should the client wish to realize the prototype. As stated previously, the requirements had hardly changed since first being written down in the state of the art. However, in this chapter requirements for the prototype were written down and used for the survey and later the prototype.

7.4 Evaluation of specification

The majority of chapter 5: specification consists of creating and evaluating the survey as well as developing the first prototype. The survey proved to be an effective media to gain insight into the wants and needs of the target group, with 68 responses, of which 64 fell within the target group. The UI design principles discussed in chapter 3 were proven, and insight was gained into what functionalities the target group would like to use as well as how interested they are in the product. The first prototype combined the results of the survey with the prototype requirements proposed in chapter 4.

7.5 Evaluation of realization

In chapter 6: realization a user test was developed based on the prototype. This user test was done with 5 participants. For this project, this gave enough insight to improve and finalize the prototype. However, it would have been ideal to have done more user test. A decent amount

of participants would probably consist of 10 to 15 people from different regions and backgrounds. Overall the participants were really enthusiastic about the prototype. They did point out several flaws, which were improved upon in the second prototype.

7.6 Conclusion

From this chapter it can be concluded that due to the project management techniques described in chapter 3 this project remained a good structure and therefore produced a successful prototype. The project was started with great ambition, which is good. However, there should be some reflection on what is possible and when you're drowning yourself in too much work. This project has gone through two iterations of prototypes. It would have been preferable to do another test. Also, to have thought of more designs at initial sketches. However, it can be argued that because the design closely follows design principles from at least four different sources this could already be the optimal design for the purpose of this project.

Chapter 8: Conclusion

8.1 Conclusion

In chapter 2: State of the art the research questions for this project were written down. In this concluding chapter these questions will be answered. The main research question was *How can an app be developed that aids women over forty with organizing healthy recipes from different sources, such that menopausal symptoms might be reduced?* With as sub-questions: *What should the main app functionalities be? What should the usability of this app entail, considering the target group? How can the iterative Creative Technology Design Process be used to achieve an effective prototype?* Starting with the sub-questions. The main functionalities were included early on in the requirements for the application. These requirements were evaluated in both the survey and the users test. In both instances the efficacy if the requirements were confirmed. Secondly, extensive research has been done on UI design for the target group. Using this research sketches were developed and evaluated. The sketched following the design principles the closest proved to be the preferred designs for the target group as well. Lastly, the Creative Technology Design Process has shown to be a very useful technique in structuring such a project, as well as giving opportunity for an iterative designing process working closely with the target group.

To answer the main research question, two prototypes have been developed. It can be concluded that these prototypes are efficacious and therefore the project has been successful. It should be noted that the tool that was developed does not take over the role of the dietitian but is a supporting tool. In the next section recommendations will be made on how to reduce the involvement of the dietitian, should this be desirable.

8.2 Future works

8.2.1 Realization of the prototype

This project mainly focusses on the design and functionalities of the final application. However, throughout the project back-end software and SQL-queries are described. To realize this project a programmer could take the recommendations for development, as well as the elements discussed in this project and finalize the development of the app. What the costs of this will be as well as how long it will take depends on the programmer's rate and capacity.

8.2.2 Machine learning

As mentioned previously there are recommendations to lessen the load of the dietitian. A straight forward way to do this is to implement machine learning. Machine learning is where you give a computer a set of instructions on how to recognize and recommend different attributes. With this set of instructions, the computer can expand its own knowledge to a certain extend. The principle of machine learning could be applied in this app by combining it with the teachings of the dietitian. The system can then give the user recommendations of recipes they have already saved as well as new recipes. In this way the user can have a balanced diet with fewer visits to the dietitian, who will have more of an evaluating role.

8.2.3 Smart fridge add-on

In chapter 2, one of the preliminary ideas for the direction of the project was that of a smart fridge or smart fridge container. This idea is still certainly very interesting to explore, but it was chosen to keep it outside of the scope of this project. This was to allow for a starting building block app that can be expanded easily. With the prototype design as it stands now the app can be extended endlessly. Other add-ons could include: a macro nutrient tracker or combining the current functionalities with grocery services, such as grocery stores or meal boxes.

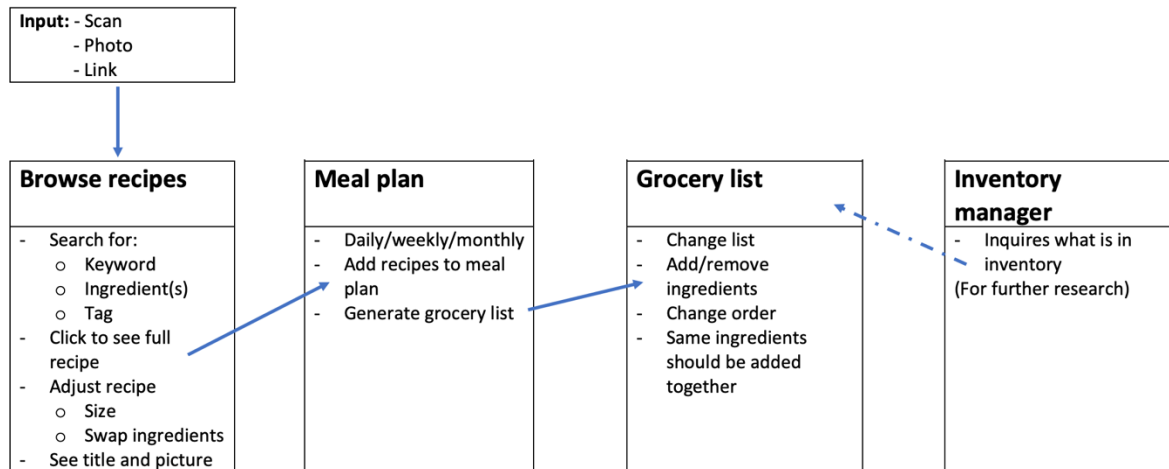
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<https://doi.org/10.1097/GME.0000000000001208>

Chapter 10: Appendices



Appendix A: Dutch version of survey

Vragenlijst App voor meal planning and management

* Required

Toestemming

In deze vragenlijst zal je anoniem vragen gaan beantwoorden over het design en de functionaliteiten van een fictieve mobiele applicatie die zal helpen met het plannen en managen van maaltijden. Dit is om een beeld te krijgen van wat mogelijke gebruikers belangrijk vinden in een dergelijke applicatie. Deze vragenlijst is volledig vrijwillig om in te vullen. De data die met deze vragenlijst verzamelt wordt, zal niet worden verspreid. Persoonlijke data zal niet gerelateerd worden aan antwoorden op andere vragen, het zal slechts gebruikt worden voor het verzamelen van deelnemers voor verdere vragenlijsten of interviews.

1. Ik begrijp het onderwerp en doel van deze vragenlijst *

Mark only one oval.

☐ Ja

2. Ik begrijp dat dit een vrijwillige vragenlijst is *

Mark only one oval.

☐ Ja

3. Ik begrijp dat de data die met deze vragenlijst verzamelt wordt niet verspreid zal worden *

Mark only one oval.

☐ Ja

4. Ik begrijp deze vragenlijst anoniem is *

Mark only one oval.

☐ Ja

Introductie

Gedurende de komende twee maanden zal een prototype ontworpen worden voor een mobiele applicatie, die gebruikers zal helpen met het plannen en managen van hun maaltijden. Het idee is, dat deze app methodes en processen die de meeste mensen al gebruiken in hun routine zal digitaliseren. De doelgroep voor deze applicatie zal vrouwen tussen de leeftijd 40 en 60 zijn. Deze doelgroep is gekozen, omdat deze leeftijdsgroep vaak te maken krijgt met kwalen zoals verminderde energie en verschillende soorten pijn. Deze kwalen komen vaak door de verandering die hun lichaam doormaakt in deze periode. Het is aangetoond dat een fatsoenlijk dieet kan helpen met deze kwalen verbeteren. De app is bedoelt om het makkelijker te maken om je te houden aan een dieet, door gepaste plannings technieken te gebruiken. In dit eerste deel van de vragenlijst zal je algemene vragen beantwoorden over het plannen en managen van maaltijden.

5. Op basis van de hiervoor gegeven introductie, zou je geïnteresseerd zijn in een dergelijke app *

Mark only one oval.

	1	2	3	4	5	
Zeer eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeer oneens

6. Hoe oud ben je? *

Mark only one oval.

- ☐ Jonger dan 30 jaar
- ☐ Tussen 30 en 40 jaar
- ☐ Tussen 40 en 45 jaar
- ☐ Tussen 45 en 50 jaar
- ☐ Tussen 50 en 55 jaar
- ☐ Tussen 55 en 60 jaar
- ☐ Ouder dan 60 jaar

7. Welke van de volgende methodes gebruik je al om maaltijden te plannen? *

Check all that apply.

- ☐ Een agenda
- ☐ Een boodschappenlijstje
- ☐ Uitgeprinte recepten
- ☐ Een receptenboek
- ☐ Een map met verzamelde recepten
- ☐ Iets dat je calorieën of een voedselgroep (bijvoorbeeld koolhydraten) bijhoudt
- ☐ (Smartphone) camera
- ☐ Other: _____

8. Hoe vaak gebruik je hierbij een app? *

Mark only one oval.

	1	2	3	4	5	
Altijd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Nooit

9. Vind je het fijner om een mobiele app of een papieren variant te gebruiken voor dit soort dingen? *

Mark only one oval.

	1	2	3	4	5	
Mobiele app	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Papier

10. Hoe comfortabel zou je zeggen dat je bent met een smartphone? *

Mark only one oval.

	1	2	3	4	5	
Ik gebruik mijn smartphone voor alles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Ik gebruik liever geen smartphone

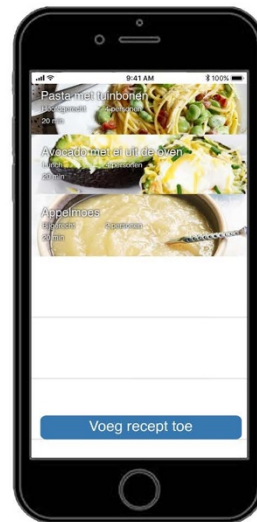
Design

Hoe een app eruit ziet is een belangrijk onderdeel van het maken van een app. In dit deel zal gevraagd worden wat je voorkeuren zijn wat betreft design. Bij elke vraag worden er twee ontwerpen getoond. Er wordt gevraagd welk ontwerp je het meeste aanspreekt of dat je geen voorkeur hebt.

11. Welk ontwerp heeft jouw voorkeur? Links zie je een simpeler design, rechts zie je een uitgebreider design *



A



B

Mark only one oval.

- ☐ Ontwerp A
- ☐ Ontwerp B
- ☐ Geen van beide

12. Welk ontwerp heeft jouw voorkeur? Links zie je meer informatie op het scherm, rechts gaat meer uit van intuïtiviteit *



A



B

Mark only one oval.

- ☐ Ontwerp A
- ☐ Ontwerp B
- ☐ Geen van beide

13. Welk ontwerp heeft jouw voorkeur? Links zie je een meer georganiseerde lay-out, rechts zie je een meer dynamische lay-out *



A

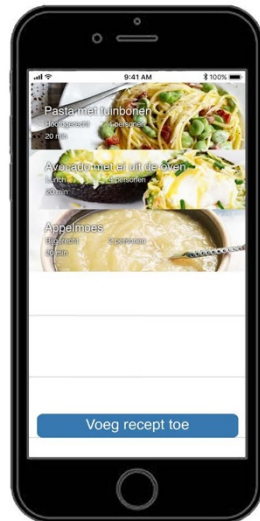


B

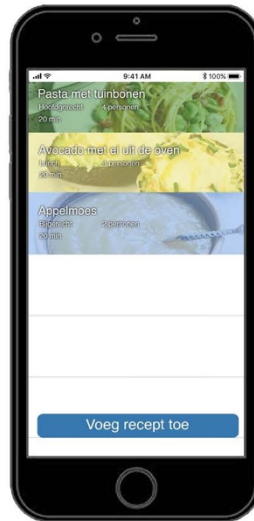
Mark only one oval.

- ☐ Ontwerp A
- ☐ Ontwerp B
- ☐ Geen van beide

14. Welk ontwerp heeft jouw voorkeur? Links zie je meer kleur, rechts zie je meer eentonige kleuren *



A

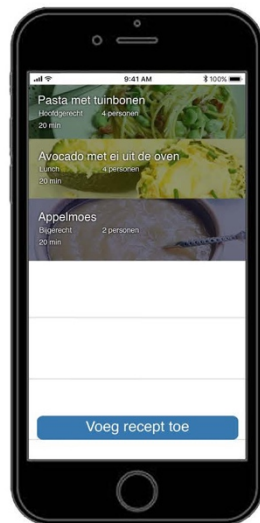


B

Mark only one oval.

- ☐ Ontwerp A
- ☐ Ontwerp B
- ☐ Geen van beide

15. Welk ontwerp heeft jouw voorkeur? Links zie je donkere kleuren, rechts zie je lichtere kleuren. *



A

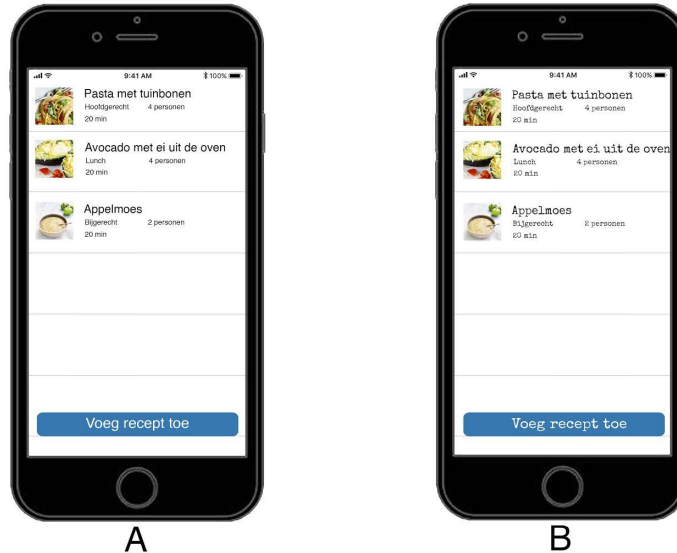


B

Mark only one oval.

- ☐ Ontwerp A
☐ Ontwerp B
☐ Geen van beide

16. Welk ontwerp heeft jouw voorkeur? Links zie je een basis lettertype, rechts zie je een speelser lettertype *



Mark only one oval.

- ☐ Ontwerp A
☐ Ontwerp B
☐ Geen van beide

Funcities

In dit deel zullen verschillende mogelijkheden voor functies worden uitgelegd. Er wordt gevraagd hoe waarschijnlijk je het vindt, dat je een app met een dergelijke functie zou gebruiken.

17. Ik zou een app gebruiken waar ik een foto kan maken van een recept en zo recepten kan opslaan *

Mark only one oval.

	1	2	3	4	5	
Zeer eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeer oneens

18. Ik zou een app gebruiken waar ik een foto kan maken van een recept en zo recepten kan opslaan en de app zou mijn recepten automatisch ordenen en sorteren *

Mark only one oval.

	1	2	3	4	5	
Zeer eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeer oneens

19. Ik zou een app gebruiken waar ik per dag kan inplannen wat ik ga eten *

Mark only one oval.

	1	2	3	4	5	
Zeers eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeers oneens

20. Ik zou een app gebruiken waar ik per week kan inplannen wat ik ga eten *

Mark only one oval.

	1	2	3	4	5	
Zeers eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeers oneens

21. Ik zou een app gebruiken waar ik per maand kan inplannen wat ik ga eten *

Mark only one oval.

	1	2	3	4	5	
Zeers eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeers oneens

22. Ik zou een app gebruiken om een boodschappenlijstje te maken *

Mark only one oval.

	1	2	3	4	5	
Zeers eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeers oneens

23. Ik zou een app gebruiken om automatisch een boodschappenlijstje te maken, afhankelijk van een recept *

Mark only one oval.

	1	2	3	4	5	
Zeers eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeers oneens

24. Ik zou een app gebruiken om automatisch een boodschappenlijstje te maken, afhankelijk van wat ik normaal koop *

Mark only one oval.

	1	2	3	4	5	
Zeers eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeers oneens

25. Ik zou een app gebruiken om automatisch een boodschappenlijstje te maken, afhankelijk van wat er gedetecteerd wordt dat er nog in mijn koelkast staat *
- Mark only one oval.*

	1	2	3	4	5	
Zeer eens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Zeer oneens

26. Welke functie(s) ben je het meest in geïnteresseerd? *
- Check all that apply.*

- ☐ Het combineren van recepten
- ☐ Het sorteren en ordenen van recepten
- ☐ Een dagelijks meal plan
- ☐ Een wekelijks meal plan
- ☐ Een maandelijks meal plan
- ☐ Een digitaal boodschappenlijstje
- ☐ Een automatisch gegenereerd boodschappenlijstje
- ☐ Aanbevelingen op basis van wat ik mogelijk nodig heb of wat ik nog maar weinig van heb

27. Zijn er nog andere functies waar je naar geïnteresseerd zou zijn die hierboven nog niet genoemd zijn? Zo ja, welke? *

Einde

28. Wil je nog iets kwijt over deze vragenlijst? *

Appendix B: Protoype screens

●●●●○ PROTO.IO

15:57

90% 

Boodschappenlijst

<input type="checkbox"/>	First
<input type="checkbox"/>	Second
<input type="checkbox"/>	Third
<input type="checkbox"/>	Label

Leeg Boodschappenlijst



Boodschappenlijst

<input type="checkbox"/>	First
<input type="checkbox"/>	Second
<input type="checkbox"/>	Third
<input type="checkbox"/>	Label
<input type="checkbox"/>	Hier
<input type="checkbox"/>	Zal
<input type="checkbox"/>	Je
<input type="checkbox"/>	Ingredienten
<input type="checkbox"/>	Zien

Leeg Boedochappenlijst



Vandaag

Ontbijt	Voeg toe...	▼
Lunch	Voeg toe...	▼
Avondeten	Voeg toe...	▼
Snack	Voeg toe...	▼

Morgen

Ontbijt	Voeg toe...	▼
Lunch	Voeg toe...	▼
Avondeten	Voeg toe...	▼
Snack	Voeg toe...	▼

Maandag

Ontbijt	Voeg toe...	▼
Lunch	Voeg toe...	▼
Avondeten	Voeg toe...	▼
Snack	Voeg toe...	▼

Dinsdag

Ontbijt	Voeg toe...	▼
---------	-------------	---

● ●



Naam recept

Categorie

Voorgerecht

Hoofdgerecht

Nagerecht

Neem Foto



Verwijderen

Opslaan

Cancel



Naam

Hier komt informatie te staan over
het recept/categorie. Met als doel
de gebruikers te leren over een
gezond dieet



Categorie

Bereidingstijd

Info

Aantal porties

Ingredienten



Hier



Zal



Je



Ingredienten



Zien

 Zoek

Avocado met ei uit de oven

Lunch

4 personen

20 min



Pasta met tuinbonen

Hoofdgerecht

4 personen

20 min



Appelmoes

Bijgerecht

2 personen

20 min



Avocado met ei uit de oven

Lunch

4 personen

20 min



Voeg recept toe

Pasta met tuinbonen

Hoofdgerecht

4 personen

20 min





Naam recept

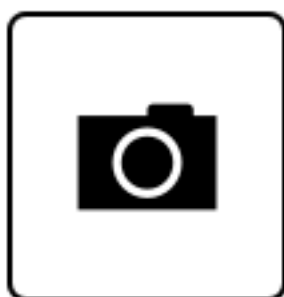
Categorie

Voorgerecht

Hoofdgerecht

Nagerecht

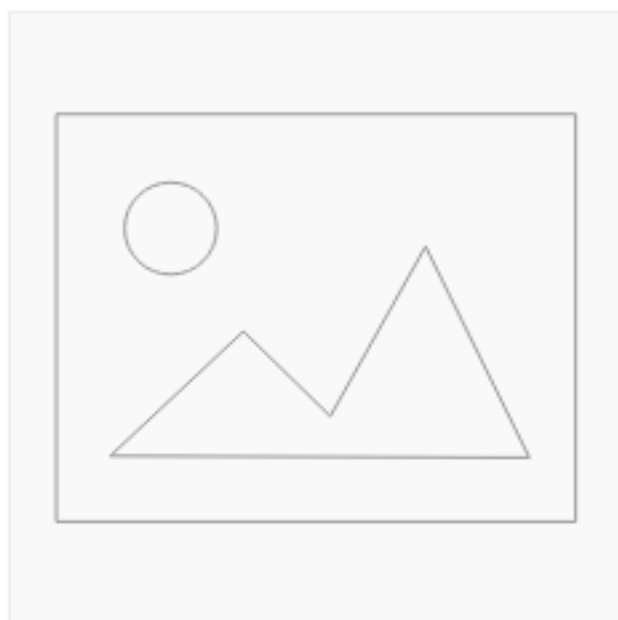
Neem Foto



Klaar



Naam



Categorie

Bereidingstijd

[Info](#)

Aantal porties

Ingredienten

<input type="checkbox"/>	Hier
<input type="checkbox"/>	Zal
<input type="checkbox"/>	Je
<input type="checkbox"/>	Ingredienten
<input type="checkbox"/>	Zien

Appendix C: information sheet and consent form user test

Information Sheet Research for ‘Recipe and Meal management mobile application for Willieanne.nl by Renske Martine Blaas’

Researcher

Name: Renske Martine Blaas
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Research leader (supervisor)

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Critical Observer

Name: Randy Klaassen
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Telephone number: +31534896762
E-mail address: j.h.w.vandenboer@utwente.nl

Secretary of Ethics committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente

Name: J.M. Strootman-Baas
Telephone number: +31534896719
E-mail address: ethics-comm-ewi@utwente.nl

Research procedure information

In this questionnaire, questions will be asked about a mobile application that will be presented on the researcher’s mobile phone. First you will be asked to blindly test and explore the application for 10 (say: ten) minutes. After that you will be asked to perform a series of tasks and you will be asked question about your opinion on the difficulty of the tasks. This will take about 10 (say: ten) minutes. Lastly there will be a part where questions are asked about both the design and functionality of the application, this will also take about 10 (say: ten) minutes. There is no potential for discomfort or risk involved in the participation. There is no remuneration for the participation. You have to be 18 years or older to participate in this research.

The purpose of the research is for me, Renske Martine Blaas, to be able to test the requirements and efficacy of aforementioned application, so that research done in report “Recipe and Meal management mobile application for Willieanne.nl by Renske Martine Blaas” can be validated

Anonymity and GDPR

Your data will not be disclosed to third parties without your permission. As part of the University of Twente, I am obliged to comply with the General Data Protection Regulation

(GDPR, or AVG in Dutch). For this I take measures with regard to the processing and inspection of personally identifiable data, such as your name, age, and signature.

Participation

Your participation remains at all times voluntary and you may always, without giving any reason, refuse to participate in the research. You may also end your participation at any time and may also refuse afterwards (within 24 hours) to allow your data to be used for the research. This will not have any adverse consequences for you.

Consent form for 'Recipe and Meal management mobile application for Willieanne.nl by Renske Martine Blaas'

I hereby declare that I have been informed in a manner which is clear to me about the nature and method of the research as described in the aforementioned information brochure 'Information Sheet Research for 'Recipe and Meal management mobile application for Willieanne.nl by Renske Martine Blaas'. My questions have been answered to my satisfaction. I agree of my own free will to participate in this research. I reserve the right to withdraw this consent without the need to give any reason and I am aware that I may withdraw from the experiment at any time. If my research results are to be used in scientific publications or made public in any other manner, then they will be made completely anonymous. My personal data will not be disclosed to third parties without my express permission. If I request further information about the research, now or in the future, I may contact Renske Blaas or Wendy Oude Nijeweme-d'Hollosy. If you have any complaints about this research, please direct them to the secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente, J.M. Strootman-Baas, telephone: +31 (0)53 489 6719; email: ethics-comm-ewi@utwente.nl).

Signed in duplicate:

.....
.....

Name subject

Signature

I have provided explanatory notes about the research. I declare myself willing to answer to the best of my ability any questions which may still arise about the research.

Renske Martine Blaas

Name researcher

Signature