DESIGNING A DATA ENABLED PRODUCT TO SUPPORT DAILY COOKING PRACTICES.
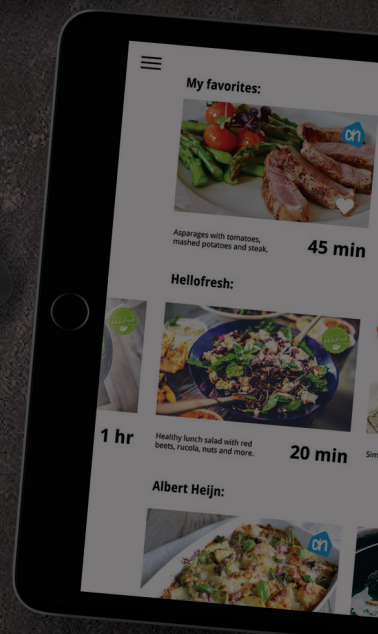
Joric Koghee
Jorickoghee@gmail.com
www.jorickoghee.nl

Delft University of Technology
Faculty of Industrial Design Engineering
Landbergstraat 15
2628 CE Delft
The Netherlands
info@tudelft.nl
www.io.tudelft.nl

Hike One
Schiedamsedijk 40a
3011ED Rotterdam
The Netherlands
hello@hike.one.nl
www.hike.one

Mentor: Stella Boess
Department of Industrial Design
S.U.Boess@tudelft.nl

Chair: Gerd Kortuem
Department of Industrial Design
G.W.Kortuem@tudelft.nl

Company mentor: Sophie Crull
Interaction Designer
Sophiecrull@hike.one

0. ABSTRACT

ATAG is a Dutch kitchen brand with their office in Duiven. Together with Hike One, a design agency specialized in digital design they are exploring the new trend, internet of things. And because ATAG is making kitchens, specifically they are exploring in the context of the kitchen.

Currently ATAG is developing and releasing connected kitchen appliances, the big benefit of these is not clear yet. But for ATAG it is important to differentiate from their competitors, they hope to do so through their designed interaction in their kitchen with the help of IoT.

Finding a starting point:
The project starts with understanding the context which is going to be designed in. The history of the kitchen was researched first to understand what the context was and why it is how it is now.
Then current food trends were analyzed in order to create a future vision that fitted with ATAG for creating a data enabled product that fitted the future of eating and the vision of ATAG.

ATAG wants to use design to assist and enable users in their daily life in the kitchen. Which was in line with the food trends analyzed.
In contrast to its competitors who often want to control and automate.

The project than focused on the target user, which for ATAG are cooking enthusiasts, and the motivations they have in the kitchen.

Cooking enthusiasts:
To understand the motivations of the target group of ATAG, practice theory was used.

Practice theory is a method in which an activity in a context, such as cooking, is used to understand what people find important, what they like and dislike about it, what they think feel, do and use in this practice .

Cooking enthusiast were interviewed while cooking in their kitchen about their daily cooking practice. After this the data was processed and analyzed.

This resulted in clear practice models for cooking of cooking enthusiasts, as well as four persona's.

Idea generation:
By using the persona's and the practice models, ideas were generated through a generative session both with other designers and by the graduate student. Which resulted in the final concept, Sjef.

Sjef is an app which is connected to multiple sensors that the user puts on their pans. Sjef guides the user from beginning to the end through the process of cooking. By giving actionable insights at the right time, and learning from the user, Sjef guides the user through a recipe and plans in a smart way.

Testing:
Sjef was tested with 5 users in context with the help of a working prototype. It was not connected to any sensors but was functional to the extent that participants could cook one recipe and experience a different way of cooking because of Sjef. However was very scripted and not as smart as the real product should be in the end.

Final product: Sjef.

The output of the evaluation showed that Sjef should be an app that is installed on a Tablet or other smart device.
This would then be connected to the sensors that one would put on their pans.
In contrast to the designed selection and creation of recipes, now Sjef would be partnered with a recipe website, app, company to make the threshold to start cooking to a minimum.
When being guided with cooking, Sjef would assist from the preparation until the meal is done.
Also it would then be possible to fully see the whole recipe before starting to cook. Meanwhile during cooking it is also possible to see what the next step is and read ahead.

Implications for ATAG and HikeOne:
Sjef proved to be a concept that is worthwhile to look further into. Though it is not realistic in the next year, and there are questions about the technical aspect and the business aspect of such a product, it gives a good indication on how interaction could work in the future of the connected kitchen.
It also shows how complicated it is to develop something that would have such an impact in the kitchen.

Developing such a product could be a unique way to show the competition that cooking can be done in the future and that ATAG has a unique vision on how cooking will work.
Not only will it give a great opportunity to the consumer to experience that and choose ATAG over it's competition.

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Acknowledgment.

TUDelft

ATAG

Hike One

1. INTRODUCTION

This chapter will introduce the two parties involved that made this project possible, ATAG a well-known kitchen brand and Hike One a big digital design agency. Both parties were very interested in a digital solution for the kitchen context. But before we are going to look into the assignment itself, I will first introduce ATAG and Hike One.

Hike One

Hike One is a company with over 60 digital product designers located in Amsterdam, Rotterdam and recently also Eindhoven. They believe good design is critical to make advanced technology useful for people. They work on everything that has a button or a screen. Besides the browser and the smartphone they work on User Experiences for tv, cars, harbor cranes, thermostats, wearables, luggage drop-off units and more.

Mission:

Hike One wants to make new innovative and creative products. Great products begin with great user experiences that is why they are user centered. They work in a lean and agile way to their goal. They combine business, user experience and new technical developments to create their products, it is their sweet spot. Technically it works perfectly, users walk away with it, and there is a profit.

Products:

The agency is mostly focused on making digital products for big service providers in the Netherlands and Belgium. Brands such as D-reizen, Ziggo, 2dehands.be, Nu.nl, Schiphol Airport.

Figure 1, Projects of Hike One ▸
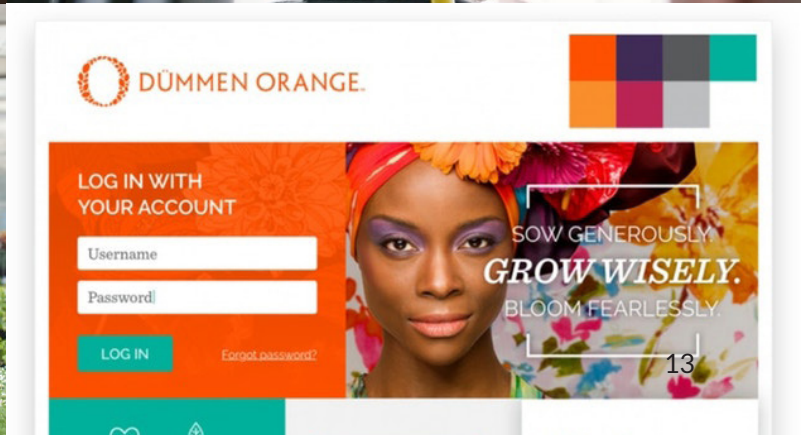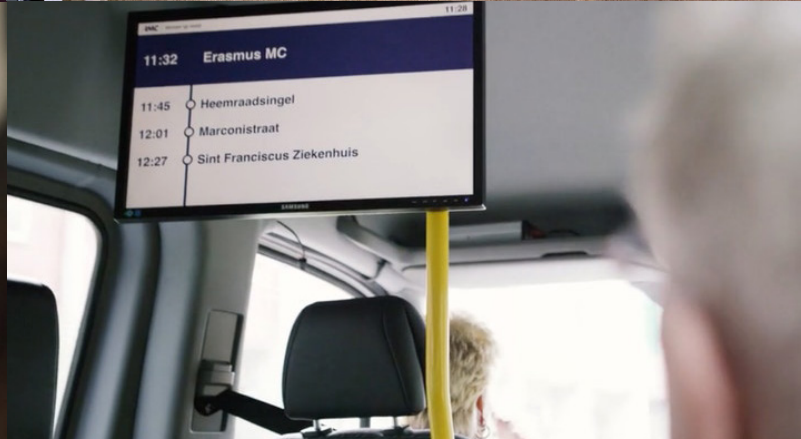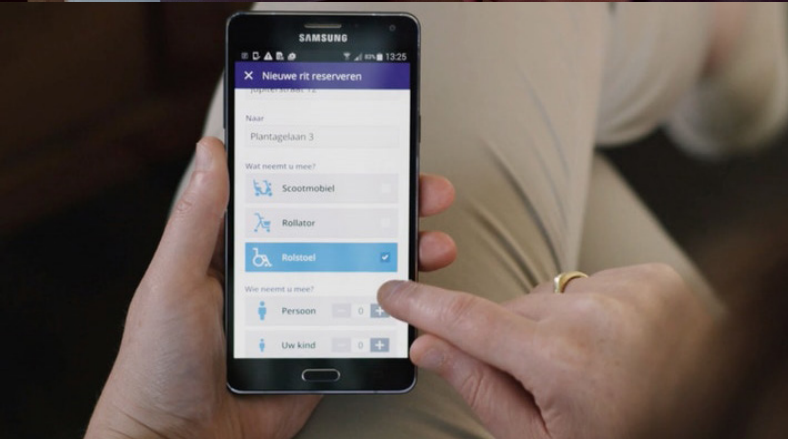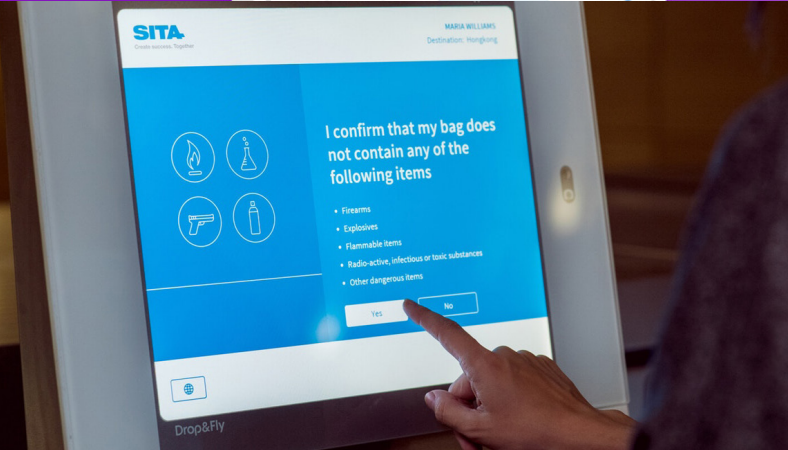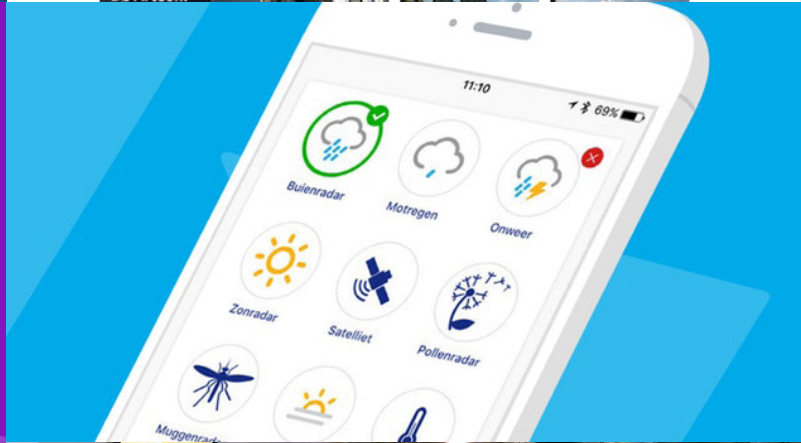
ATAG
we love to cook

ATAG: For more than 60 years ATAG manufactures kitchen appliances of the highest level. The Dutch brand has its origins in Ulft where it began manufacturing gas cookers and stoves. The popularity of ATAG increased rapidly and this is even after 60 years.

Mission:

At ATAG it's all about the cooking experience. One day you prepare a fresh meal, the next day is about delivering something special to your guests you made with passion. Their high end kitchen equipment helps people with this. This way ATAG adds with beautiful practical sustainable quality appliances. The wishes and experiences of hobby-cooks are translated by ATAG into reliable kitchen appliances that are easy to use, that want to be seen, with intuitive power and great Dutch design of high quality and easily cleaned.

Products:

From built in kitchen appliances, gas or induction cooktops, furnaces, ovens, combi (steam) ovens, (combi) Microwaves, built-in coffee machines, vacuum drawers, warming drawers, accessory drawers, extractor hoods, dishwashers, fridges and freezers, taps and accessories. The kitchen appliances are all high-end, high quality materials with neat finish. The products are also on the higher end compared to it's competition.

Figure 2, Kitchens of ATAG ▶

2. ASSIGNMENT

Currently cooking is experienced as a necessity to meet nutritional needs by people who are cooking for themselves[1], time consuming if the goal is to make healthy food[2] and since there are multiple people in a household to arrange who buys the groceries, who cooks and decide on the ingredients the process is considered inconvenient[3]. One of the reasons for this is the changing lifestyle and decrease of free time[4]. Cooking does not seem to fit well with our current lifestyle, and this has a bad effect on the health of parents and children/adolescents[5]. While at the same time society wants to be eating healthier[6]. And we want to spend more time with our families[7].

The Internet of Things, from here on referred to as "IoT", introduces new possibilities into the context of the kitchen. The real use of data enabled technologies remain to be discovered. This project seeks to develop an example of an application of data-enabled technology that fits real users' life practices[8] and answers to their daily needs.

3. PRACTICE THEORY

When designing a product it is important to understand the context you as a designer are designing for. Here there are physical limitations, other products being used and people influencing the context and each other. Practice theory by Kuijer is a theory that allows a designer to analyze an activity within a context. Since the project started without knowing exactly, what was going to be designed, this tool was used as a puzzle with blank pieces that needed to be filled in, in order to design a product within this context. The report will, when possible, reflect on this theory.

Images

What people feel
and think during the
activity.

Stuff

What things people
use for the activity.

Skills

What people do
during the activity.
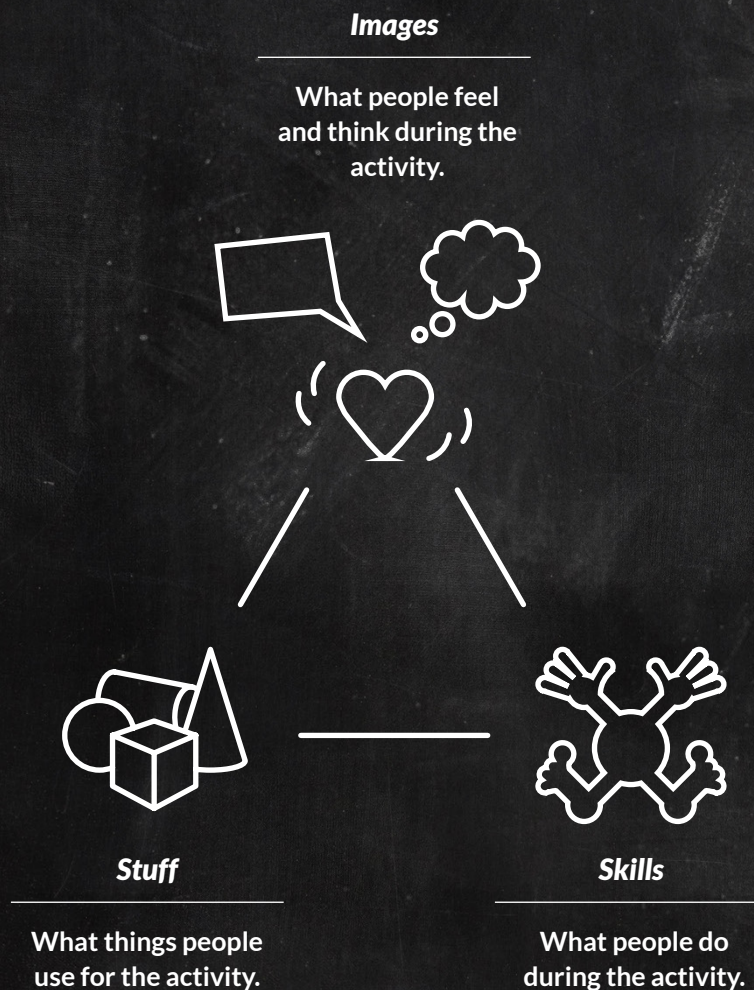
Figure 3, Practice theory model ▲

Practice theory by Kuijer is a design method to research a particular activity, such as cooking for example.

Such an activity can be viewed as the result of three things. The first are the stuff that people use for the activity. The activity that is used for this project is cooking. Stuff people use when cooking are for example ingredients and utensils.

Then there are the skills people need for such an activity, for cooking. Skills they need are cutting the ingredients and stirring a pan.

Finally the third thing is the meaning of the activity, what people say about it, feel and think while doing the activity. Feelings they might have are joy because they like cooking, but at the same time insecurity, because they perhaps are not familiar with the recipe.

4. KITCHEN HISTORY

To design for the future context of the kitchen, we are first going to understand the past. The following pages describe the development of the kitchen as a context and in the end analyzed in practice theory. Explaining what things people use in the kitchen, skills people needed to learn or have, and how society looked at the context of the kitchen in a western society. This research was done to get a grip on what the kitchen as a context was and why it is how it is today.

Kitchen context over the years. [11]

Kitchens < 1600.
The home consisted for most people of one room. This room was heated by a fireplace, on which also the food was cooked. The kitchen was the living room and the bedroom all in one.

Kitchens 1600 - 1700.
With the introduction of the chimney, the smoke of the fireplace could be drawn away. This make it easier to breath in the room but also allow for greater fires. This development however caused the division of the home by making two rooms, the living room for receiving guests and doing business, and the kitchen.

Kitchens 1700 - 1800.
The context was very formal. There were elaborate dishes, a formal table setting and strict etiquette. Because of trade between America, Asia and Europe this brought new dishes to the table, and therefore also new demands by the consumer. By this time the kitchen existed of a great numbers of cutlery, dish ware, ovens and other cooking products. It was common for each course to last one hour of eating, with dinner consisting of multiple dishes. There were dinner parties that lasted hours. However this was with the rich families.

For the normal folk, the kitchen still remained a separate room but with increased utensils as well. The food would be prepared in this room, but the ingredients could be in all kind of different places. Herbs could be dried in the attic, flour and vegetables would be in a cool cellar, water would be brought in and it would require traveling around the house in order to prepare the evening's meal.[9]

Kitchens 1800 - 1900.
The kitchen starts to change rapidly because of technological and industrial developments. A turnspit dog comes in the kitchen to turn the spit, coal is used for the fire and later replaced by gas, electricity gets into houses as well as plumbed water. Almost all of these developments made sure to reduce labor and time.

For cooking, cast iron stoves were now used which increased heating capacity and caused for faster cooking times.

The kitchen was still in the back of the main living quarters and still a woman's place, definitely and not a place to entertain guests. Another room such as the living room was used to receive the guests.

Kitchens 1900 - 1930.
Gas became the primary source of heat and allowed ovens to become smaller and lighter. Heating of cooking was not a time safer anymore. The process of making food could be made faster and easier by making better use of space.

Cabinets and workspace started to become important factors in this context. Kitchen cabinets started to emerge that allowed to store most efficiently in and created increased workspace to put food on. Kitchens were developed for the home of people, and the golden triangle was introduced with the Frankfurt kitchen. This was the most efficient kitchen plan to work best in, a 1 meter triangle where all the important appliances and cabinets were positioned. It was the first fully fitted kitchen. Everything had a place and was designed in such a way that the steps required to more around in the kitchen was made to a minimum. This was a novel and controversial idea.[10]

Kitchens 1930 - 1940.
Most of the kitchens in this time were not fully fitted yet, however every kitchen was becoming more full. Appliances became to be more integrated with the cabinetry. The kitchen changed into a more beautiful, purposeful and efficient context.

Tools become within the kitchen became more labor-saving, time-saving and the kitchen became more stylish, which caused the kitchen to become a source of pride. A place people wanted to show to others, to guests.

Kitchens 1940 - 1960.

Manufacturing advancements and the housing boom after ww2 made a tremendous impact on the kitchen. There was a huge demand on kitchen technology and equipment. Innovations emerged such as quiet ventilation hoods, shiny ovens, matching refrigerators, dishwashers and counter tops. The kitchen became a beautiful place that people needed to show off.

Even the wall between the kitchen and the living room came down and the context became an open place. The start of showing the kitchen to guests was a first step of becoming a place of entertainment.

Kitchens 1960 - 1980.

Society started to be interested in honing culinary crafts, displaying designer kitchen utensils and entertaining guests while doing so meant that the kitchen became a central and social place in the homes of people again just like before 1600.

Kitchens 1980 - 2000.

The first completely open kitchens were designed. Appliances within the kitchen were designed to show off as much as possible. The kitchen from once a hidden place became a trophy room to show off your pride.
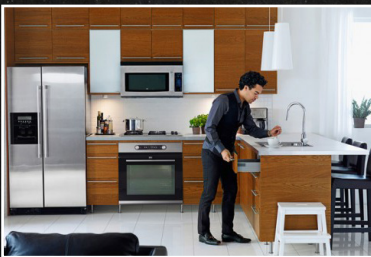
Kitchens 2000 - 2017.

The last 17 years of the kitchen did not change the kitchen as much as before. The main developments are societal changes. The kitchen is no longer a place for woman but also for men. There is an increasing interest in cooking, with bloggers entrepreneurs and shows solely focused on the creation and experience of food.

Kitchens 2017.

Kitchen appliance manufacturers are installing connected devices with new functions that automate certain activities for users. They are exploring ways to have an impact with the Internet of things in the kitchen.

Time:	Images:	Skills:	Stuff:
< 1600	Fireplace as the central place in the house for heat and food.	Heat, prepare, cook, make fire.	Fireplace, pots, pans utensils.
1600 - 1700	Kitchen and cooking as a separate activity hidden from the living room.	Faster cooking.	Chimney, special room, greater fire and heat.
1700 - 1800	Kitchen became more formal as a context. Dinner parties for the rich.	Knowledge of new products manners of eating, storing /	Increased number of cutlery, dish-ware, ovens, other cooking
1800 - 1900	Woman's place, back of the main living room. Increased speed.	Knowledge on new products with new technologies.	Turn-spit dog, gas, electricity, plumbed water, iron stove.
1900 - 1930	More integrated and less separated spaces, but still a workspace.	Learning storing, being efficients, fast with preparing food.	Smaller lighter stoves, cabinets and workspaces.
1930 - 1940	More fully fitted, all in one room kitchens. Place of pride.	Learning new tools and techniques becoming a faster, easier cook.	Integrated appliances, more options, beauty, labor and time saving tools.
1940 - 1960	Integrated with the living room, becoming a place of entertainment.	More tools required more skill and bigger inventory more dishes.	Quiet ventilation hoods, ovens, kitchen refrigerators, dishwashers.
1960 - 1980	Central place of the home for receiving and entertaining guests.	Honing culinary crafts, entertaining guests.	Designer kitchen utensils, more styles and options.
1980 - 2000	Trophy room / place to show off pride.	Cook daily at home and with and for guests.	Open kitchen designs, loose standing furnaces.
2000 - 2017	Cooking is fast and easy. About eating together, social activity.	More knowledge, new dishes, learning from famous chefs on Youtube.	Smarter devices, more options.
2017 - XXXX	Intelligent, connected and automatic devices and appliances are introduced to the kitchen. The kitchen still is a very social place and people are becoming more interested in cooking with the growing amount of cooking shows and possibilities to learn to cook through tv and internet. The purpose of these connected intelligent devices and the future of the kitchen context remains to be discovered.		

5. KITCHEN TRENDS

In order to design something for the future, it is important to understand development leading to the future. In order to get some grip into what kind of kitchens would be possible in the future, current food trends were analyzed. Trends that were analyzed for this were technological trends, social trends, and societal developments. From the different trend groups were made and clustered in order to create different possible future kitchens. This chapter will cover the future kitchen that fitted ATAG the most and will define what kind of product ATAG would want to develop in the future context of the kitchen. For the full explanation of all trends and analysis please look at appendix 1-4.

Figure 4, Pictures of trends. ▲

Assisting kitchen.

In this future kitchen, people who have it like to stay in control of their food preparation without giving it away to machines. The kitchen serves as an assistant to create the food. For example the kitchen automatically starts heating up the oven or extra cool your fridge when you come home. When you are there it helps you by showing you controls over your kitchen appliances to make the perfect steak on the perfect temperature. When you get called and walk away, it automatically lowers the heat and waits for you to come back.
The user always stays in control, the kitchen only assists in a smart way.

Fit with ATAG:

ATAG is about the love for cooking, and the future of IoT and ATAG should be about supporting cooking, without taking control over the process.

This direction was discussed with designer at ATAG after which the conclusion was that this was the most interesting direction for specifically ATAG to go into.

This future kitchen vision fits the vision of ATAG itself and also is a logical choice looking at the brand hierarchy.

Brand hierarchy:

From the Brand hierarchy (Appendix 2.) and SWOT analysis (Appendix 1.) the best opportunity for ATAG is to make use of data enabled technologies in such a way that people are supported in their kitchen. The mother brands of ATAG and co-competitor is looking into making lives easier, taking over or automating activities in the kitchen.

ATAG has a different target group in mind that likes to spend time in the kitchen. Activities should not be taken over or replaced, but supported. The kitchen would have to become more of an assistant to the user and helps them in their daily kitchen activities.

6. IOT IN THE KITCHEN

New technologies are already being implemented in the kitchen. ATAG's goal is to assist the user through data enabled technology in the kitchen, but are there already devices that do that? If not, what is the meaning they address, if so how do they actually do that? Different kitchen related technologies were analyzed for what their function is in the kitchen, what skills are asked from the user, and what kind of feeling (meaning) they addressed. Below there is a visual of the different kind of values they addressed which led to the conclusion what the most addressed meanings of IoT products are in the kitchen context. For the full IOT comparison visit Appendix 5.
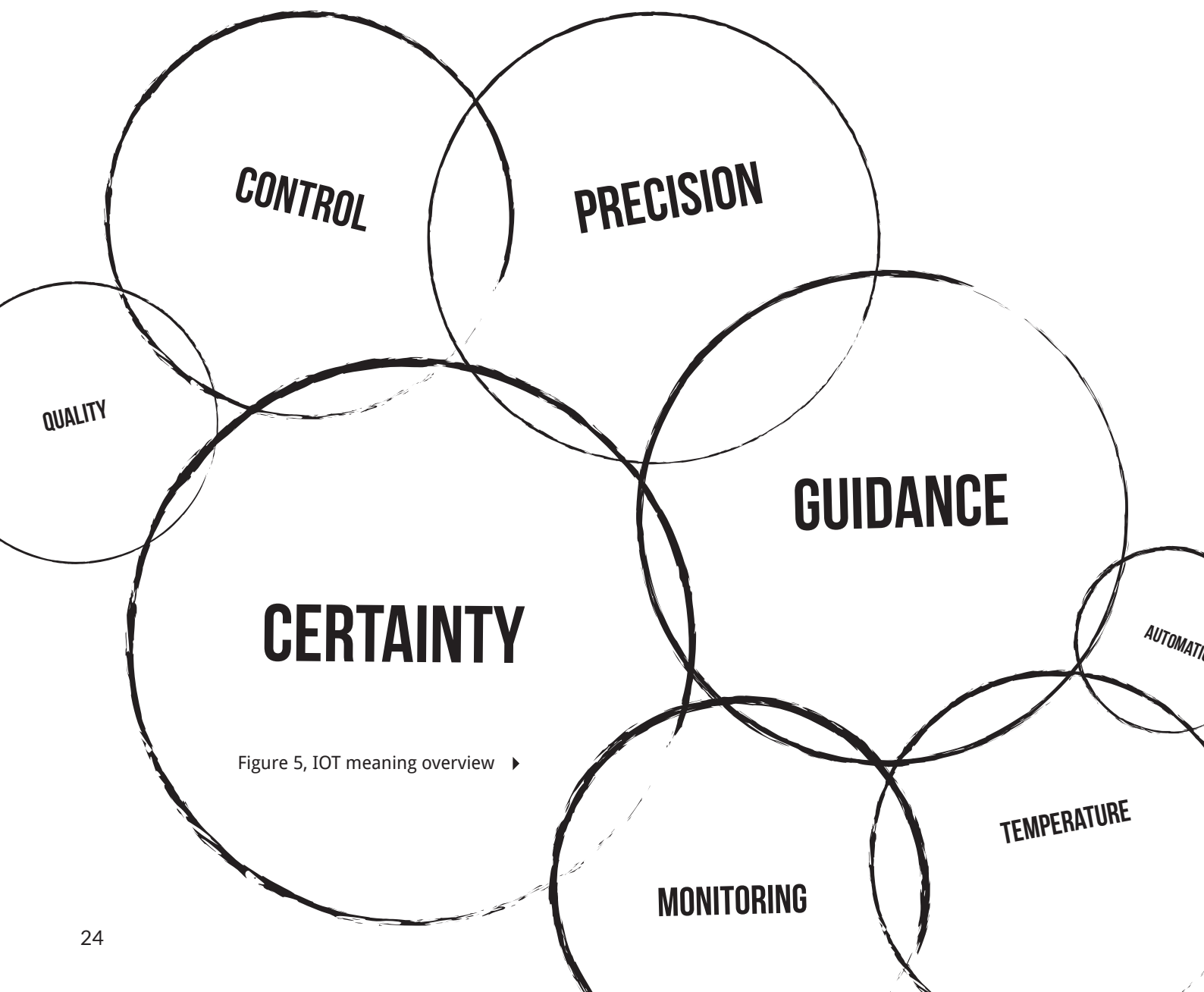
CONTROL

PRECISION

QUALITY

GUIDANCE

CERTAINTY

AUTOMATION

Figure 5, IOT meaning overview ▶
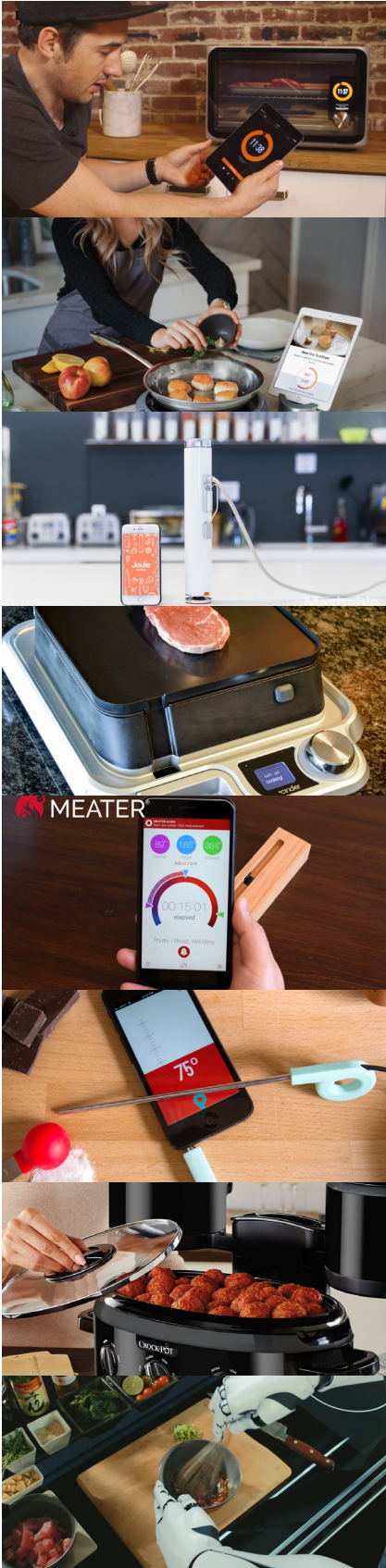
MONITORING

TEMPERATURE

Figure 6, IOT product examples ▲

1 Certainty while cooking.
Most devices valued certainty, by somehow making sure that the user can be more confident in getting a successful meal on the table.

2 Guidance in cooking
The products have an option to teach the user how to prepare certain meals and help somehow with the process. This could be by temperature, weight, ingredients and step by step instructions.

3 Precision in cooking.
Is used to define how hot food or a pan has to be for what kind of result. Some products take control over this decision through automated functions, other products leave that decision up to the user. Precision can also mean being able to be more precise in time.

4 More control when cooking.
Product use ways of giving you control to prepare something by giving you options of dishes, meals, ingredients.

5 Monitoring their cooking.
Since data is tracked by a lot of these products, many of them also are able to communicate these with the user. This is mostly done through the accompanying app that enables users to remotely see what is going on with that particular kitchen appliance.

6 Temperature precision:
A reasonable amount of these products allow for more precise temperature settings.

7 Achieve better quality meals:
All products with this value try to, or make sure that, the quality of the food is improved. They all find it important that the food in the end needs to taste better than the consumer would normally be able to achieve without it.

8 Automating cooking.
Some products were fully automated, leaving the cooking up to the machines and completely takes over the process of cooking itself.

As described with every category above, the data enabled technologies assist the user in different ways. They also address different kinds of users and have different unique selling points. To understand what is best for ATAG, a better understanding of the user was needed to make a valid decision.

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7. THE USER

To design a product for the future connected kitchen context, the user of ATAG needed to be known. This chapter will explain the process of getting to the target group of future products and will continue with a plan to uncover their meanings about the kitchen context.

To know who the target user was, ATAG stores on different locations in Rotterdam, The Hague and Delft were contacted and interviewed about customers buying ATAG products. For this a sheet with questions was made which can be found in appendix 6.

This field research data, which can be found in appendix 7, was discussed with ATAG and resulted in a general persona which functioned as criteria for finding people for conducting interviews with for further research. A big insight during this talk was that ATAG users have a love for cooking. This made it possible to narrow down the practice in the kitchen context to cooking, and helped define criteria for the persona.

It also resulted in the research question,

Average persona details:

- 30+
- Couples
- Children
- Wealthy
- Love to cook
- Reasonable cooks
- Make time for cooking
- Average technical
- Look for quality, durability, exclusivity, dependability.
- Choose ATAG for being Dutch and reliable.

Participant criteria:

- 30-40 years
- above average level of cooking
- at least spending 1 day a week elaborately cooking,
- with partner,
- preferably kids,
- above average to high income level.

"How can data enabled technologies assist in cooking?"

An average persona was made from the interviews and the talk with ATAG. Visit appendix 8 for the full persona's. This was then changed to participant criteria of people needed to do further interviews with.

In order to uncover what cooking enthusiasts say, feel, think when cooking in the kitchen context, contextual interviews were done. Which we are going to look at in the next chapter.

8. CONTEXTUAL INTERVIEWS

Contextual interviews are interviews that are performed in the context of where the to be designed product will be used, in this case, the kitchen. Participants were found by using contacts and colleagues from Hike One, ATAG, my personal contacts, Facebook groups, Linkedin, and other social media. In the end 1 pilot participant and 5 others were found for the real interviews. The following pages will describes the process of designing these sessions, performing them, and processing the data. The data from the interviews was combined into a filled in practice model for cooking, as well as the sub practices which it consists of. The information was then also used for creating detailed persona's which were used over the full course of the project.

Users were given a workbook (Appendix 9) that was send by email. The participants were asked to print this out and fill it in. The purpose of this booklet was to sensitize the participants on the subject. In this case that meant thinking about the practice of cooking, and writing down when they felt more happy and felt more neutral or sad. This was mapped over the whole process of thinking of a recipe to cooking to cleaning it up again. Also the best and least favorite moment of this process would have to be written down.

After five days the contextual interview and cooking session took place.
For this test the following was needed: a filled in sensitizing booklet, interview questions, a camera, a laptop to connect this particular camera to and a consent form to be able to document the interviews.

The participants would be explained about the interview and asked to fill in a consent form (Appendix 10). While the participant was cooking, the interview would take place. This made it possible to observe the cooking enthusiasts, by distracting

them with questions, and at the same time get information through the questions of the interview. For the full list of questions please go to appendix 11.

Because it was difficult to make notes and write down observations during the interviews, these were done afterwards. Observations were written down later after watching back the tests.

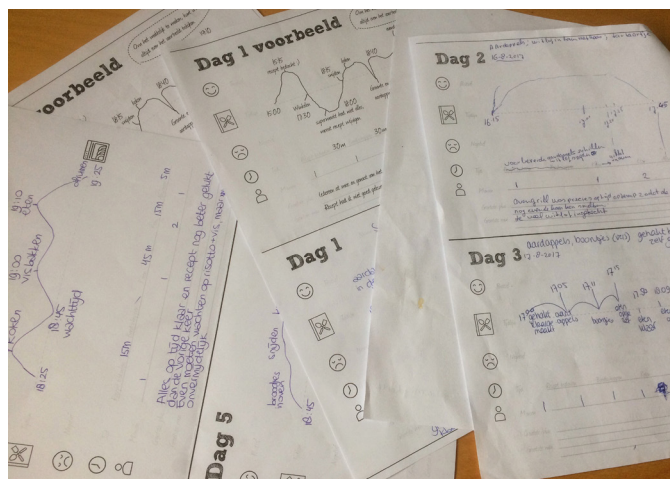In the next chapter the data of the contextual interviews is analyzed and discussed.

Figure 7, filled in workbooks.   ▲

Consent form.

Workbook.

Interview questions.

A camera.

A laptop.

Figure 8, Interview setup ▲

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9. PROCESSING THE DATA

The interviews were processed by making statement cards out of all the comments, observations and answers. The cards were then clustered into different categories, with biggest clusters that were shared amongst participants were ranked as most important. The result of these clusters was used as input for creating the practice diagram of cooking for cooking enthusiasts. From the first general practice model it was possible to create multiple sub-practice models that show the different kind of practices cooking exists of. This in turn helped in understanding what areas are the most worthwhile to focus on when designing a connected product for cooking enthusiasts.

To process the data of the interviews, the recordings an videos were analyzed. In total 6 interviews were done including one pilot interview. All important quotes and answers were collected in a document and later transformed into statement cards.

These statement cards were clustered into groups which you can see in figure 9 below.

On the right of this page you can see the overview of all groups of clusters that was collected from the interviews. The bigger the cluster, the more cooking enthusiasts talked about this subject, and also the bigger it is visualized in the visual overview to the right of this page.

In the next few pages we are going to look a bit deeper into the data collected from the observations and the interviews.
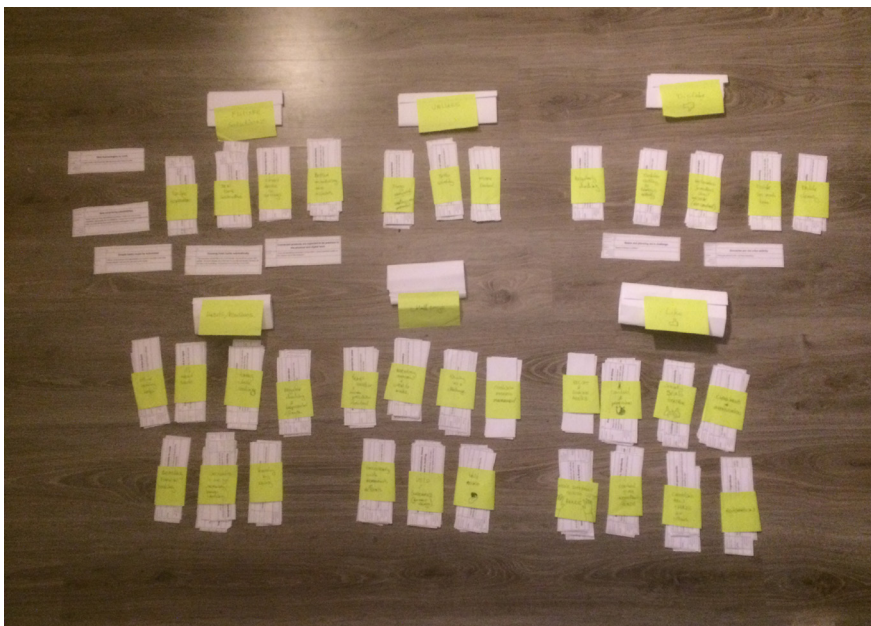
Figure 9, Clustered statement cards.

Cooking process

Taste is most important

Timing is part of the process

Personal settings are better than preprogrammed

Online help before, during and after cooking

Investing time is worth it

Regular checking and keeping focus.

Learning by doing and improvising

Groceries in one go, cooking with inventory.

Dislikes / Pain points

Space

Regular checking on food

Taking too much time

Automated fuctions don't give the right result

Dislike tedious tasks (cutting)

Dislike cleaning

Challenges

Taste is difficult to influence

Difficult to know what the inventory is

Uncertaintly with ingredients, actions, amounts

Temperature control and precision is appreciated.

Timing is difficult

Managing the cooking process, ingredients techniques.

Internet used to assist with challenges

Control over ingredients and health

Having control and precision for confidence and guarantee

Automation of certain tasks is appreciated

Likes / Passions

Smell, looks, process and quality make cooking fun

Experimentation / improvisation for variation

Doing this with your hands (therapy)

Creating something new (for others)

Using recipe & cooking instructions while cooking

Socially being together is important

Future solutions

Smart advice on settings

Better monitoring and insights

Instructions and cooking advice

Inventory recipes

New cooking technologies enabling new (creative) possibilities

Automatic herbs

Digital quality = Physical quality

Values

products if allow for r quality.

Food is personal, taste is personal, settings are personal.

New products if they allow for more

Data from observations

Observing the cooking enthusiast and looking back the contextual interviews resulted in multiple interesting activities that they did while I cooking.

First of all, timers were used to guide them in their cooking process.

Second observation that stood out was that a lot was done by feeling such as amounts, and checking if something was done tot taste.

Checking was done often by the cooking enthusiast, which included feeling, tasting, poking, smelling, looking and more.

There was a big focus on each ingrediënt by some of the cooking enthusiast, which showed the amount of effort and care the put into each part of the recipe.

For the full list of observations, visit appendix 12

Figure 11, Observations ▶

Using timers

Much cutting

Amounts by feeling
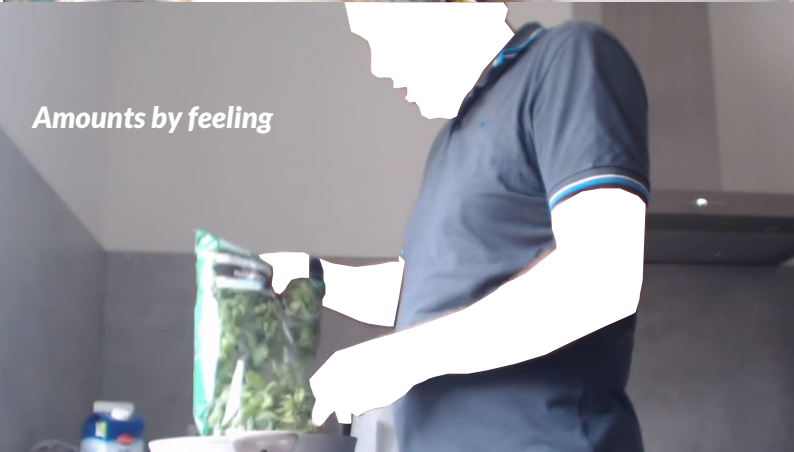
Cooking by feeling when something is right.

Struggles with setting appliances
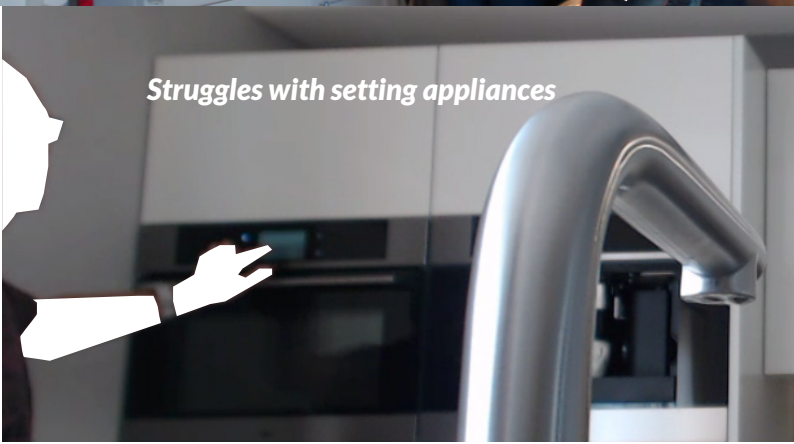
Checking often.
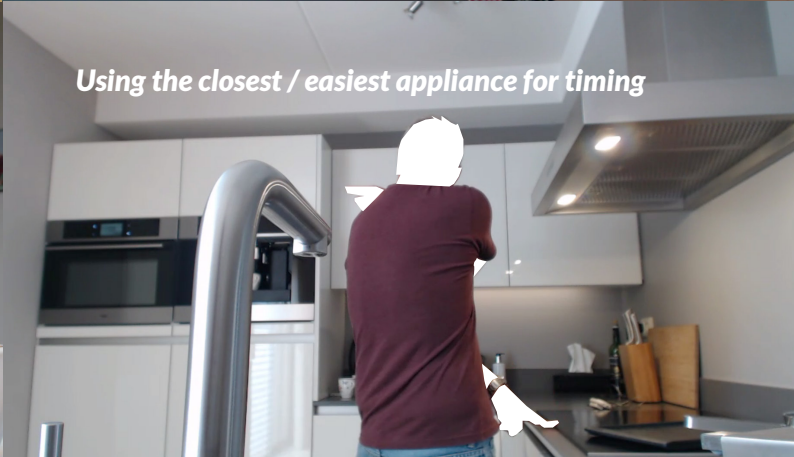
Using the closest / easiest appliance for timing

Tasting to check

Focus on each ingredient
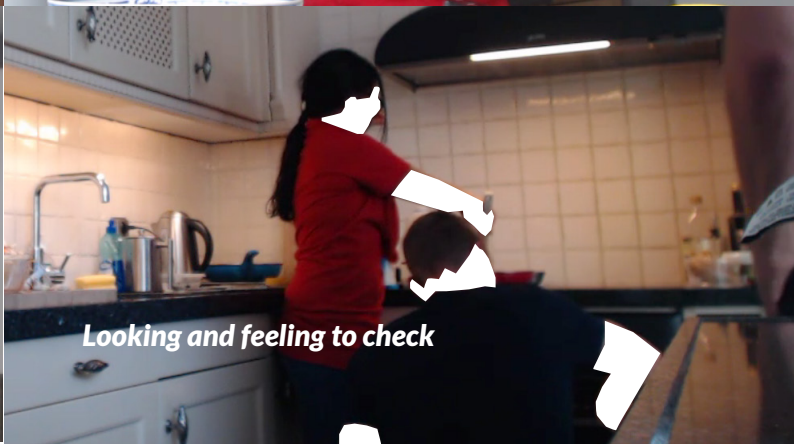
Looking and feeling to check

Data from interviews

Talking about their practice of cooking gave a lot of insight into what was important to them about cooking, why they liked cooking, what they disliked about cooking.

It was even possible to talk generatively about what future solutions they would like to have in the kitchen and how they saw the kitchen change for the coming years.

The next two pages will show one big overview of the most important insights of the interviews with the cooking enthusiasts.

This page shows an overview of the most important insights from the interviews which were used for the practice model of cooking and as input for the cooking enthusiasts persona's. The fully mapped out version of this data can be found in Appendix 13. On the right there is an anonymous overview of all cooking enthusiasts who participated in this part of of the research.

Figure 12, Cooking enthusiasts ▶

Doing things with your hands:
"When I cook I use different kind of parts of my brain instead of what I do all day. It is some sort of therapy for me. Therefore I make time for cooking" - 2

Having control and precision :
"Being more precise in temperature allows you to make your standard dishes in higher quality and also your exceptional dishes in higher quality!" - 4

Difficult to know what the inventory is:
"The biggest problem always for everyone, you don't know what you have at home" - 5

Uncertainty with ingredients, actions, amounts:
"You are always wondering what is happening on the inside of this piece of meat? This is always a challenge to know" - 3

Socially being together is important:
"I like to cook because I am together with my family, everything worked out good and I like to hear that it is nice" - 3

Online cooking help
"Sometimes I put my ipad the kitchen to check recipes or methods and techniques on how to do things for this dish" - 1

Timing is difficult:
"Timing is my biggest challenge to have everything done at the same time" - 1

Regularly checking on food feels unnecessary:
"Checking if things are done or not and moving away from my guests is especially annoying" - 2

Better quality:
"If things would increase the quality of the food, I would buy it, but not because of speed." - 5

More control:
"For example I look for the best methods that day to prepare the meat, and I set the oven accordingly." - 3

Cooking is very energy consuming:
"If I have the time, more so the energy, time you can always create. But after a long workday, and farther the week gets the less energy I have. I need an outside motivator to really cook. Else it will be more simple." - 5

Food is personal, settings are too:
" I think it is hard to automate food because what is ready? How does a thing know when I find something ready? - 4

Timing is part of the routine:
" I always use my apple watch for timers. I also user it for Sous vide because I do not trust the app. I use timers more of a general reminder." - 5

Temperature control and precision is appreciated for the process:
"Cooking is all about temperature, a better idea of that would help" - 4

Smart advice on setting:
"Technology can understand and know better what and where to measure temperature and when something is good rather than me putting in a needle." - 2

Better monitoring and insights
"My future kitchen would have appliances that all communicate information to prevent me and you from making a fuckup" - 4

Regular checking & keeping focus:
"I regularly check and try and taste and feel if it is how I want it. I am looking and feeling." - 4

Instructions and cooking advice:
"I would like to have something that tells me I have to do this now to finish the overall dish in the end. Lets me focus on one this at a time." -1

Pilot

Cooking enthusiast 3

Cooking enthusiast 1

Cooking enthusiast 4

Cooking enthusiast 2

Cooking enthusiast 5

10. COOKING AS A PRACTICE

Doing the contextual interview proved worthwhile and gave all the data necessary to get back to practice theory. Not only did the data help fill in the blanks of the model, it also revealed the most important areas to assist cooking enthusiasts with cooking. This chapter first discusses the basic cooking practice that explains all the general stuff, skills and images that are always part of the practice of cooking for cooking enthusiasts. The next pages then explain the sub-practices: Cooking on a weekday, Cooking in the weekend, Cooking a new recipe, Cooking and eating alone. The end of this chapter the most important and valuable areas are listed that were used in the ideation phase of the project.

Images

What people feel
and think during the
activity.

Stuff

What things people
use for the activity.

Skills

What people do
during the activity.
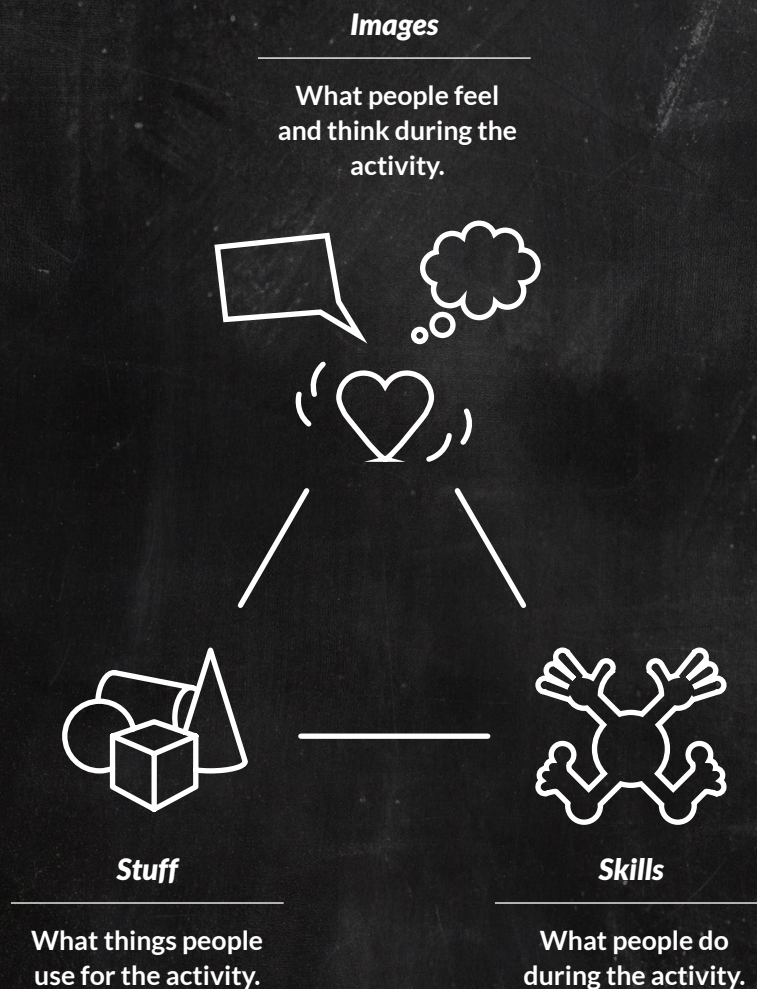
Images

1. Therapeutic activity, making something with your hands rather than thinking all the time.
2. Enjoying each others company and being social with each other.
3. Sharing the culinary experience, creating something for others.
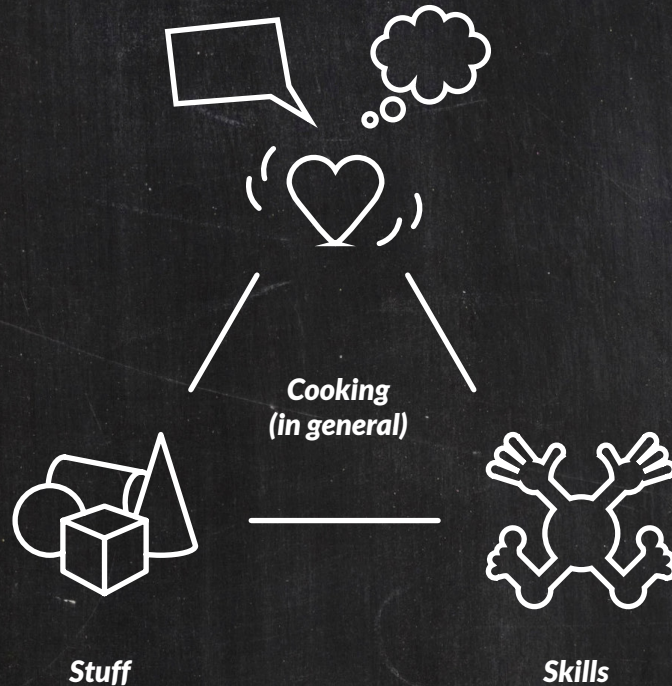
**Cooking
(in general)**

Stuff

1. Pots & pans
2. Oven
3. Fridge
4. Sink
5. Cooking top
6. Cutting board
7. Knives / Utensils
8. Water cooker
9. Ingredients
10. Tablet / phone / ....
11. Waste

Skills

1. Thinking of recipes
2. Cutting
3. Setting appliances
4. Smelling
5. Looking
6. Feeling
7. Tasting
8. Timing
9. Keeping an over-view of the process
10. Cleaning
11. Checking on food

This shows the general practice of cooking. It is very self explanatory for the most part, the stuff that is used as general kitchen equipment. Skills you would need in the kitchen are also listed as well as the images. The skills are all neutral or positive except for cleaning and checking up on the food. It does not matter when or what somebody is cooking, cleaning and checking up on food are always experienced negatively.
The feelings and emotions towards cooking were very positive and show cooking is about sharing a nice experience.

—— Like / passions.
—— Dislike / pain points
—— Challenges

Improvise to make something nice and easy.

Difficulty with managing inventory for recipes

Not being able to spend the time

Less time.

Not enough energy to cook.

Cooking practice weekday

Timing is a challenge

Things go wrong.

Not knowing if the temperature is correct. (temperature)

Managing the cooking process
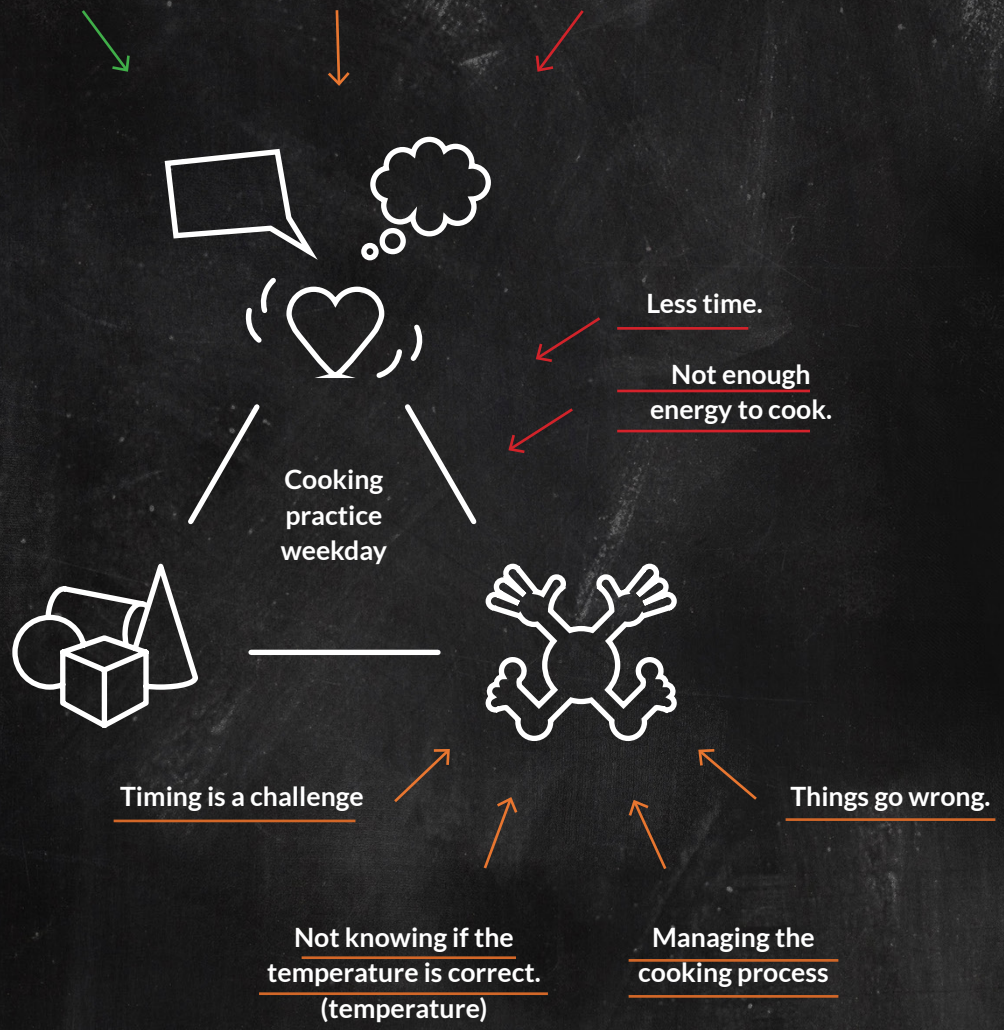
This shows the practice of cooking during the weekday. Now during the week the cooking enthusiasts mentioned they had less time to cook and less energy for cooking. This resulted in negative feeling towards the cooking practice because not being able to spend the time they would want to. It is nice though because of this limitation to improvise and make something tasteful and easy. Managing the inventory to be able to make something each day of the week is a challenge to do though.

During the activity of cooking, the skills such as timing and managing the cooking process stay a challenge. Things can also go wrong because cooking on a stove top results in high temperatures and short cooking times. Timing everything correctly is therefore a challenge. Finally the temperature while cooking is something they have feeling for, but they do not know if the temperature they use is the best. Determining if they are at the right temperature stays tricky.

Like / passions.
Dislike / pain points
Challenges

Being insecure about skills and next steps. (process / recipe)

Being creative, making your own recipes and twists to food.

Taking the time

Making something more elaborate.

Cooking practice Weekend

New Tools

New ingredients

Timing is a challenge

Reading / watching instructions from the internet

Managing the cooking process

New techniques

Not knowing if the temperature is correct. (temperature)
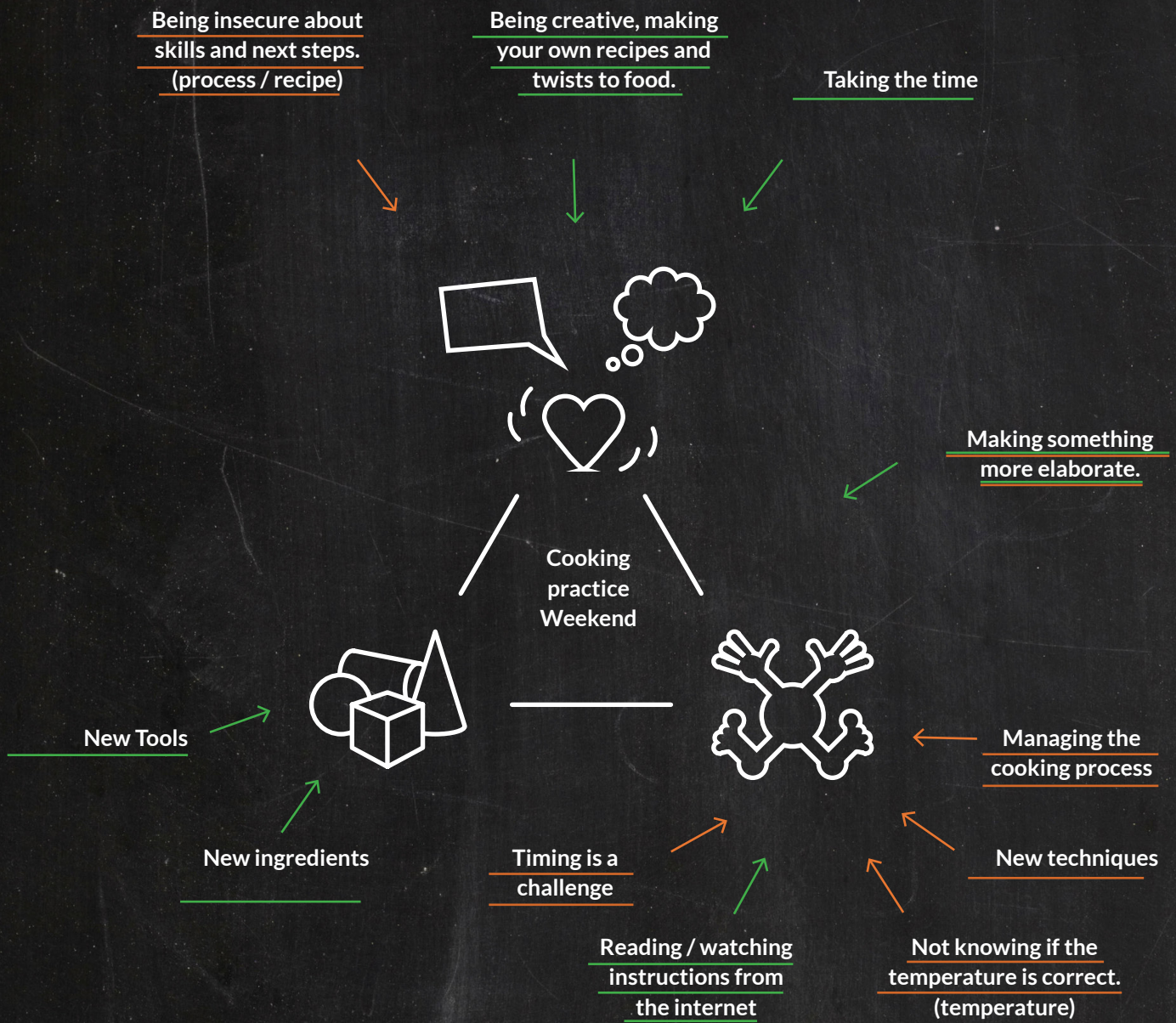
This shows the practice of cooking during the weekend, where in contrast to during the week, people tend to have more time to cook. Therefore they choose to make something more elaborate and take the time for it. They try out new recipes, new tools, new ingredients. Though they are making something new it is very fun and sometimes challenging, because they might need to learn something new, they need to manage a different cooking process and timing is more of a challenge now.

To do so the cooking enthusiasts tend to watch and read instructions from the internet, which is an activity on their own they like to spend time on. When thinking of and looking for a new recipe for the weekends, they like to be creative and make their own twist on the food.

Like / passions.
Dislike / pain points
Challenges

Want to leave a
good impression.

Being uncertain about
skills and next steps.
(process / recipe)

Being creative, making
your own recipes and
twists to food.

Taking the time

Insecure about amounts
and proportions.

Discovering
something new

Having guests over
for diner.

Cooking
practice
New recipes

Managing the
cooking process

New Tools

New techniques

New ingredients

Timing is a
challenge

Reading / watching
instructions from
the internet

Taking into account
other's taste.

Not knowing if the
temperature is correct.
(temperature)

This shows the practice of cooking when making new recipes. This sub practice is relatively similar to that of the weekend. An extra external factor influencing this might be having guests over for dinner. What that leads to is that the person cooking has to take into account also the taste of others, which is a challenge. They are confident in preparing something the way they like it, but making it so that others also find it to their taste stays exciting. When having guests over they want to make a good impression and therefore also want to do a little more effort. They will try to discover something new and make something different. Which makes it all the more difficult for them to make it correctly, fit to their taste, and that of the guest. Overall the cooking is more challenging than normally on all fronts.

Like / passions.
Dislike / pain points
Challenges

Enjoying each others company and being social with each other.

Sharing the culinary experience, creating something for others.

Not taking time.

No reason to impress.

Cooking practice
Eating alone
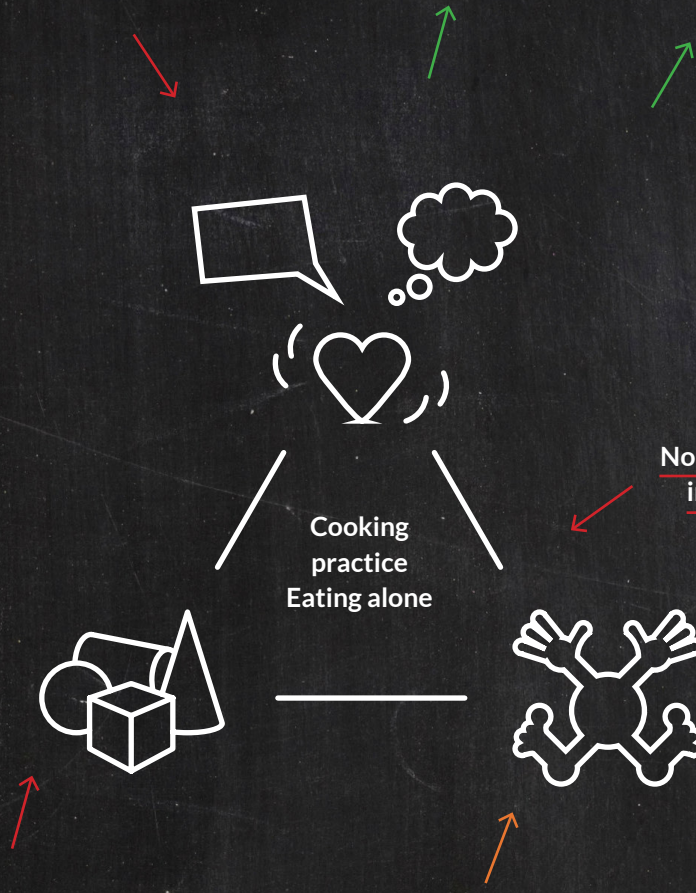
Less ingredients

Timing is a challenge

Cutting down on skills overall.

When cooking alone the practice of cooking is very different. They tend to prepare something very easy or even order in. They use less ingredients and do not take the time because they don't see the activity as rewarding. The main reason they like to cook is to enjoy the company of others and share a culinary experience, with all the social entertainment.
Therefore the cooking enthusiasts lose interest, have nobody to impress, and cut down in skills overall.
Timing stays a challenge because there is less pressure of making something nice for others.

Like / passions.
Dislike / pain points
Challenges

11. PERSONA'S

Gut feeling chef.
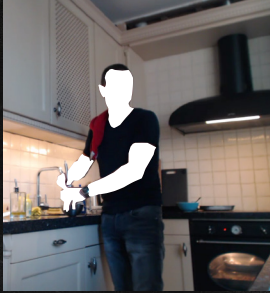
Name: Joost Blok
Age: 30 years old.
Relationship: Married.
Children: no.
Job: Architect.
Hobby's: Soccer, reading, cooking.

Joost is living in Utrecht with his girlfriend. He works at an architecture firm and loves to create things. He also does this when creating food. His biggest passion next to architecture is food and creating nice meals. Every day he makes new dishes for him and his wife. He always improvises and experiments with new tastes and ingredients.

Likes
- Cooking by feeling.
- He regularly checks and keeps focus while preparing something.
- He learns by doing.
- Cooking is doing things with your hands as therapy. It is different from thinking all day.
- He is always experimenting and improvising for variation.

Dislikes
- He hates to check up on food when it is unnecessary, because it draws him away from the guests.

Challenges
- Taste is difficult to master and influence.
- He is uncertain with ingredients, actions and amounts.

The timer guy.

Name: Kevin de Vries.
Age: 36 years old.
Relationship: Married.
Children: yes, 2
Job: Consultant.
Hobby's: traveling, cooking, tennis.

Kevin de Vries is a consultant at KPMG in Amsterdam. He is married, has two children with whom he likes to spend time with. During the week he has little time for cooking, therefore he likes to keep it simple. He focuses on the food by timing everything correctly, however it is more of a general reminder for what has to be done. Other ways of lettings off steam is traveling and playing tennis.

Likes
- Times everything to keep control.
- Taste and result are most important in the end.
- He always wants to have fresh ingredients with good taste. As well as having the right proportions and the least to throw away.

Dislikes
- He dislikes cleaning activities but does them because they are necessary.

Challenges
- Timing is difficult, mostly for elaborate and new dishes. Since then he wants to leave a good impression.

Precision Chef

Name: Maarten Stronk
Age: 38 years old.
Relationship: no
Children: no.
Job: Project Manager.
Hobby's: Cooking, Reading, Blogging.

Maarten loves to cook. He loves it so much he blogs about it. With his two years of media education before going into sales he knows some tricks of making good blogs and movies for on the Internet. He likes to share his new creations and discoveries that he does. When he discovers a new ingredients or recipe, he learns about it online or tries to find something about it in the library.

Likes
- Investing time in cooking is worth it, since he can enjoy food better.
- He likes to have control of his cooking by using his Sous-Vide or steamoven.
- He likes having precision and control because it gives him confidence and guarantee that the result will be the way the wants it.
- Automation of certain tasks such as cooking pasta is appreciated by him. He is looking to buy products that actually do this just like at Vapiano's.

Dislikes
- He hates automated functions that do not give the right result. He is able to set appliances better than those programmed settings.

Challenges
- Temperature control and precision is appreciated for preparing meals. This still remains difficult since it is hard to find the perfect temperature.
- He has difficulty knowing what the inventory is and what to make with it.

Ipad Recipe follower
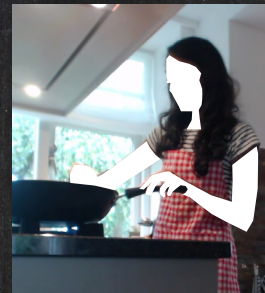
Name: Maartje van der Geest
Age: 25 years old.
Relationship: Yes
Children: yes, 1.
Job: Dietitian.
Hobby's: Cooking, eating with friends or family, hiking.

Maartje is 24 years old, married dietitian with one child. She loves to spend time with her family and is a very social person. When she spends time cooking she does it for her family, But she also tries t come up with new things. Though she is a reasonable cook, she does like to keep recipes and instructions nearby. Therefore she uses the ipad in the kitchen. It is the most important kitchen tool. It helps her reach good quality and spend quality time with her family.

Likes
- Using recipes and cooking instructions while cooking.
- Online help before, during and after cooking.

Dislikes
- Cooking can take too much time when she also needs to do other things.
- She dislikes tedious tasks such as cutting or peeling because it leads to little results and satisfaction.

Challenges
- She uses internet to assist her with challenges and her ipad in the kitchen as assistance.
- Managing the cooking process is difficult as well as adding the right ingredients and doing techniques right.

12. DESIGN DIRECTIONS

The outcome of the practice models resulted in six design directions. These six directions were the most important skills, observations or meanings when comparing all practice models to each other. These were used as input for the ideation phase, the next chapter of this report.

Not knowing if the temperature is correct. (temperature)

1 Better control & precision of temperature during cooking.

Users appreciate being able to have more control over temperature and precision while cooking. Sous vide is for example a technique as well as steam ovens they all love. This precision and control while cooking improves the overall confidence of the chef. How can data enabled technologies allow for better control and precision of temperature in pots, pans?

Timing is a challenge

2 Better timing of food while cooking.

While cooking is based on feeling, there is still a big struggle in the timing of all dishes in the meal. How can we help people with their timing. Timing is very specific to the food however, and personal in taste. How can data enabled technologies help with timing?

Being uncertain about skills and next steps. (process / recipe)

3 Real time instructions for dishes/ recipes while cooking.

While cooking enthusiasts are capable chefs, they still use instructions in the form of text, images, videos etcetera. Data enabled technologies could track amounts of and type of ingredients and assist the user in the cooking process, but how?

Taking into account other's taste.

4 Guidance in taste while cooking.

Food is very personal because of people's taste. It is difficult to make decisions on what to add to the current recipe for what kind of different taste. The cooking process will be supported nicely if the products could help with this thinking process. How can data enabled products help with taste while cooking?

Checking on food.

5 Better monitoring of food and checking while cooking.

Cooking is very much about checking up on your food en keeping an eye on it. This involves temperature, steps, and the whole process of preparing a dish. How can data enabled technologies communicate better to the user what the current state of the food is?

Difficulty with managing inventory for recipes

6 Managing inventory and recipe suggestions / inspiration.

Cooking is very much about checking up on your food en keeping and eye on it. How can data enabled technologies communicate better to the user what the current state of the food is?

"Tasty" Integration
- Easy Acces instructions
- Hands Free

Remote check safe notifications
- Remotely check the state of the kitchen

Knobs 2.0 °C 210°

Reside cooking
select thaw you want it, instant settings

Smart advice on settings
smart your pizza extra crispy?
- "yes"
- ok settings applied
"cool"

Easy search perfect time & settings

Image recognition recipe advice

Video support when cooking
how instructions

Visual time END start

Smart Pots & Pans

Programmable pans

Setting database personal

UR instructions

Window Display projector
knows who's cooking what to show

Voice assistant
- what is my next step?
- how to boil water?
- can you learn on...?

Smart cooking top
- weight grams?
- analyse in temp/fibre?

Alerts when you have not checked under

Smart instruction pans hop
- learn
- advice
- reuse

Tips for cooking Hotline
- techniques
- pics/videos

Temperature tokens

Timer only help

Precise appliance

Scan/pic for reorder

Curiour assistant

out of milk/...

Nutrition

Remote video check everything

precise blends
- temp measure
- controls
very hands on

Smart cutting board scale
weight amounts proportions

Fridge image recognition

Kitchen arms assistant

Cooking Hero

Activity planner
preparation
cook
Apro is
Plans blends

Smart garden

Smell task mode
how to use to check smell taste

Trash-can inventory

45

13. GENERATIVE SESSION

The goal of the workshop was to get as much inspiration to further generate ideas with. After researching the subject for already quite some time, it was a challenge to keep a broad view on the subject. Therefore the opportunity was taken to use the knowledge of other "fresh" designers to think of new ideas and directions. The generative session was designed as follows:

Generative session:
First the project was introduced for 5 minutes. Then couples were assigned and got 10 minutes to think of ideas for that sheet, in this cae contexts. For all sheets visit appendix 15, a small version of the sheets are shown in figure 13.

The second job was to think of how to do an activity within those different contexts, also for 10 minutes.

With the third sheet the context of the kitchen was introduced, and now they had to take the different ways to do an acitivty and project that onto the kitchen context.

After this the participants rated the ideas on criteria with dot voting, and picked the best idea from that.

Together with the graduate student they chose the final idea and worked that out in a storyboard. After this the groups discussed their final idea and other ideas.

Instead of doing a session with six people, only four was possible to arrange with at the time. Therefore the session was changed to handling two directions with four people. The graduate was facilitating the session to keep control over the process.

One remaining direction was ideated on by the graduate student himself. The outcome of this brainstorm can be found in Appendix 16.
The directions are listed below:

1. Better control and precision of temperature could be combined with better timing of food while cooking and better monitoring and checking. While cooking these directions are very closely related, therefore ideating in one of these directions would inherently mean touching upon the other ones. Therefore these three directions were combined into one.

2. Real time instructions for dishes and recipes while cooking, was combined with guidance in taste while cooking. Instructing somebody about what a good next step is for a recipe includes a lot of information from the taste of the user. It would make sense to ideate into what advice to give in next steps for recipes, but also for taste at the same time.

3. One direction remained which was managing the inventory and giving recipe suggestions and inspiration. This was kept as the final and third direction.

After this the ideation phase had a short detour which Is in Appendix 17, but is deliberately left out to keep the story consistent.

Diverging the ideas:
As a start for the solo session the output of the previous sessions was used. All ideas were put on the wall and were supported with newly generated ideas. After a total of 33 ideas were put on the wall (figure 14), they were clustered into groups. There were 9 groups identified of which one groups was random (figure 15). The nine groups were; notifications, proportions/amounts, settings, instructions, temperature precision, timing, inventory reordering and recipe suggestions.

These groups helped to think of new ideas to generate and later clustered in groups that were small, and variations or other ways to reach the same goal. This increased the amount of ideas to a total of 46.
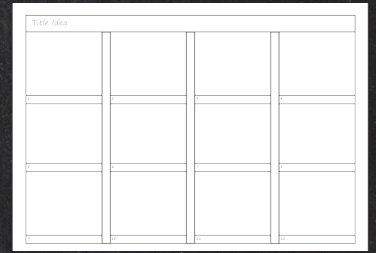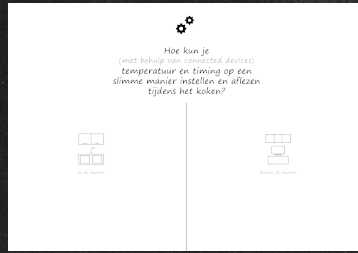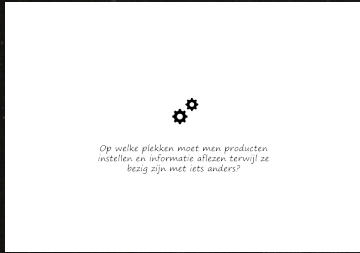
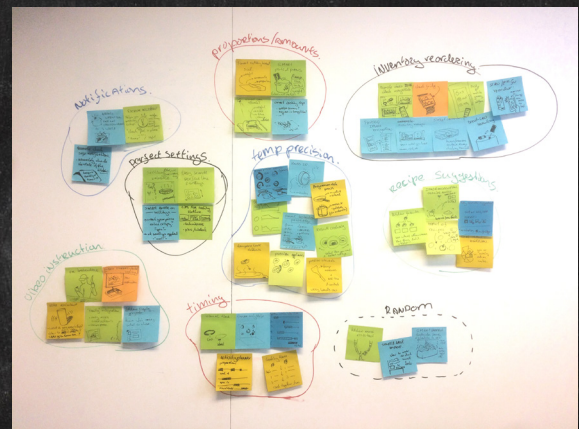Figure 13, Workshop sheets ▲

Figure 14, Ideas on the wall ▲

Figure 15, Ideas clustered ▲

Users

Hike.One

ATAG

▲ Figure 16, Ideas mapped out

Selecting ideas:

To make a selection the ideas were plotted on a chart which mapped an area that takes into account the user, ATAG, Hike One. How likely the user is to purchase such a product, how likely ATAG is to develop such a product and how likely Hike One is to develop such a product. From this many ideas could be eliminated and the six best ones were used to continue with.

The green circle shows the area that is most interesting for all parties involved and was used to continue with. Some ideas were closely related so combined into one actual idea. For each idea a new post-it was made as shown below. The six concepts of post-its were transformed into storyboards to further think about what kind of impact they would have in the kitchen. This also made it possible to give them more depth and compare them. To make it easy to remember and compare them, each idea and post-it has an icon that fits it. Which is later used in the analysis phase.
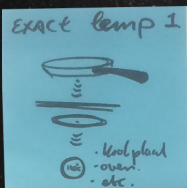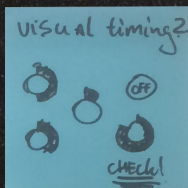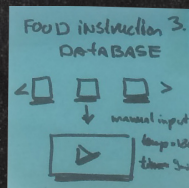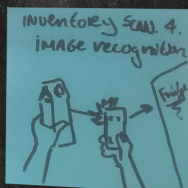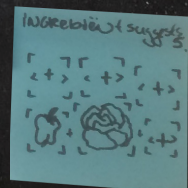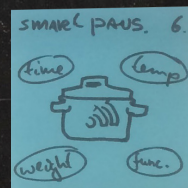
Concept 1	Concept 2	Concept 3	Concept 4	Concept 5	Concept 6

14. FINAL CONCEPTS

1. Precision temperature kitchen.

This concept of connected pans and cooking top allows to be more confident and helps you leave a good impression.

The user is known with the exact temperatures of different foods and or cooking / baking times. If not, these could be searched for easily online. The appliances that are connected and embedded with sensors allow the user to be super precise with the temperature that they have in their pots and pans. Being able to be so precise gives them the confidence and guarantee of reaching that same quality every time.

The cook top also reminds them once in a while to check their food if that has not been done, or could give a signal when the temperature is too high.

2. Visual kitchen.

In the kitchen there is a projected display on a surface, such as a wall. This display is controlled through hand gestures. The display is a hub which allows users to show recipes they often make. Through swiping in the air they flip through their recipes, and by clicking they select their meals.

They get a suggestion on how to set their timers for what pits from previous time they cooked the meal. In cases they make something new, they would have to set all timers themselves. The visual overview allows them to see what pits have how much time left, remind them to check a pit or the oven again. While cooking they can see easily what they should check again, how much time they have and this allows them to plan their own activities better while cooking.

What is a nice plus is that everything can be put off or adjusted through the air, no reason to make anything dirty anymore, while keep doing the dirty work with your hands.

3. Smart Scale

The smart scale concept is a scale that precisely measures what is put on it. By picking what you are making and specifically choose options to fit your taste and food, it gives advice in how to prepare it. This advice helps the user to set their appliances better by knowing better how high or low the temperature needs to be and get advice on the time. The assumption with this concept is that the product gives users extra confidence in preparing food and gives them more handles to use when cooking or baking something. Different users can login to the system, what this does is that it allows the system to learn from each user. Learning from their personal taste and giving personal advice.

4: Inventory manager

Multiple kitchen cameras are put in a fridge, or integrated in a fridge. Through image recognition the inventory manager checks what kind of food you have. These allow the user to check what kind of food is there, and track what goes in and out of the kitchen. The manager could automatically keep track of a grocery list and pass this information through to all users in the house so you always know what you have. Theoretically such a system could well be combined with a purchasing service that helps you manage your inventory overall.

5: Recipe advisor and inspiration

The recipe advisor is a concept that uses image recognition to see what kind of food is laying on the table. By seeing what, how much and how big something is it could give suggestions on what other ingredients would fit the meal well. Just like concept 3, the advisor could learn from your taste and get better at advising the more it gets to know you. It could give inexperienced home chefs more guidance in what ingredients are good to combine and give experienced chefs extra inspiration to get to new dishes.

6 Smart pans.

Connected pans that weigh, and sense temperature. The products are connected to a device such as an ipad, or phone to allow the user to instantly see how much of what they put into the pan. This could give them a lot of control and confidence that they add the right amount of ingredients to their dish. The pans give notifications when the user should check their food again in short intervals, or less often if it has to cook for a long time. It also gives notifications when the temperature is going too high and the user has to take action.

The pans are programmable in the sense that you could swipe on different setting for that pan to make that kind of dish perfectly. So if you make pasta it could remember those settings, but also for making a stew.

15. CONCEPT SELECTION

To make a decision on what concepts to continue with, they were tested on three different aspects. One was feasibility and innovativeness, one was usefulness and IoT potential, and finally they were rated on what kind of meanings they addressed.

Feasibility - innovativeness (figure 17)

From this analysis the concepts 1,2,6 came out the best. Since they were very feasible technically and innovative. The other concepts 3,4 and 5 were very dependent on a database of products or technologies that are not as advanced and proven to work this good yet. For example, concept 4 is highly dependent on image recognition to work well. It also requires a system where product are easily tracked and measured, which does not exist yet. Same applies to concept 5 which also is very dependent on image recognition. Concept 3 requires less of that, but is less feasible in a sense that it needs a huge database that needs to be created for all kinds of foods the product needs knowledge of.

In contrast, concepts 1,2 and 6 are all very technical concepts that are possible with technology that exists and is implemented today. Which makes them much more feasible.

Usefulness - IoT potential (figure 18)

From the usefulness - IoT potential the concepts 1,2,6 also came out best.

Again concepts 3,4 and 5 came short in this comparison since they are very individual concepts. Yes they could be implemented in a connected kitchen but do not add much value to being in connected to other devices.

Concepts 1,2 and 6 would gain a lot of functionalities when connected to other appliances, while keeping a function on their own. The products therefore also have a social factor that the other concepts miss, the potential of connecting more objects and connecting to users more through different objects.

Concepts vs Meanings: (figure 19)

In terms of meanings, the concepts 1,2,3, and 6 ranked best. They address the most meanings of all concepts. Being social, creative, improvising, feeling confident, leave a good impression and being secure with proportions were amongst of these. Though concept 3 only addressed four meanings, it also was considered an option since it addressed important values during cooking such as feeling confident, leaving a good impression and being secure about amounts / proportions.

Concepts 1,2,3 ranked best overall, but 2 and 3 appeared to be very similar. Both concepts are about measuring and potentially regulating temperature through

smart(er) appliances. The difference is mainly in the extent to how much the product is able to act upon it. Therefore the decision was made to continue with 2. Concept 2 was stronger on its own since it already gives the user some more information to cook with and could become concept 3 when combined with connected appliances such as a smart cooking top. This way there were two concepts, one focused on helping with timing, the other with assisting with being more precise.
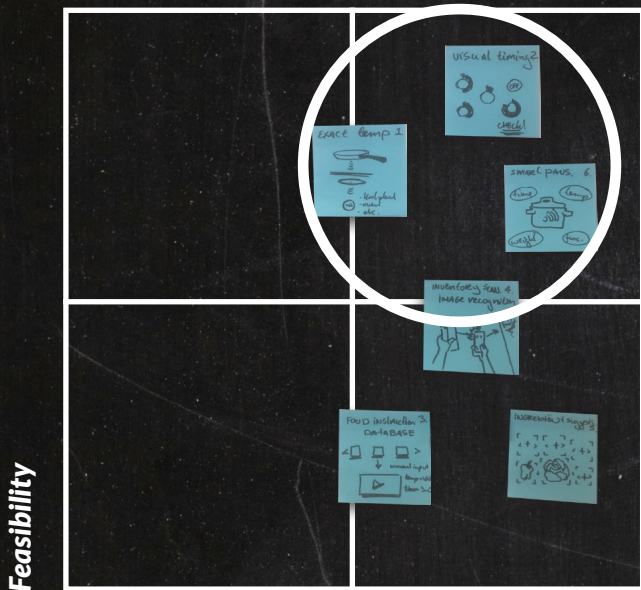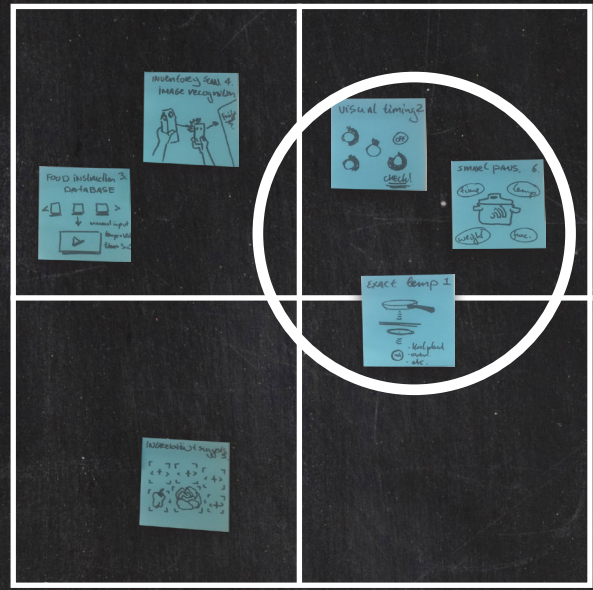
Feasibility

innovativeness

Figure 17, Feasibility vs Innovativeness ▲

Impact

IOT potential

Figure 18, Impact vs IOT potential ▲
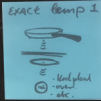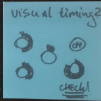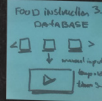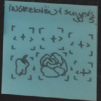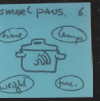
Meanings	EXACT temp 1	visual timing2	FOOD instruction 3 DATABASE	inventory scan 4 IMAGE recognition	INGREDIENT suggest 5	smart pans 6
Doing something with the hands	✓	✓	✓		✓	✓
Enjoying each others company (social)	✓	✓				✓
Sharing the culinary experience						
Improvising when cooking	✓	✓			✓	✓
Managing inventory			✓	✓		
Feeling certain about actions when cooking	✓	✓	✓			✓
Want to leave a good impression	✓	✓	✓			✓
Insecure about amounts and proportions		✓	✓	✓		✓
Score:	⑤	⑥	4	2	3	⑥

Figure 19, Meanings vs Concepts ▲

16. IOT CANVAS

Instead of continuing with the two concepts a new concept was in the making. The concepts were still too obvious and not interesting enough to continue with. What the concept should do was oke, but the concepts as a whole were unsatisfactory. Using the IOT canvas (Appendix 18) the concepts were analyzed to get to their core, in order to get to a new concept. This lead to the break through moment of the final concept.

I first thought of the impact I originally wanted to have with a product in the kitchen. Then I wrote down what that impact consisted of, what kind of smaller interactions in the kitchen would be valuable within this context.

The impact for the smart pans and the connected kitchen hub were:
• to feel certain, and cook with confidence
• precise cooking
• have hands off quality time
• reminds only when needed.

In the kitchen this would enable users:
• temperature control
• perfect results
• keep control over the cooking
• only check when needed.

The sensors that would be needed for this are:
• temperature
• contact (motion)
• weight
• time

The sheets that were made showed some first notifications and interactions that I had in mind for the user when cooking. such as temperature is too high, check appliance ..., and time is up.
But what was most interesting was that, the only requirements for a product to have that impact in the kitchen, would be something that sensed temperature, contact, time and weight.

I did not feel that I designed something valuable yet. a smart screen (hub) or a smart pan would not be enough. The hub would be too big and too much screen in the kitchen. The smart pan would be a big investment for people to buy a new set of pans again. These not always fit to every stove top either.

Implementing such sensor would prove very expensive by putting them into pans. I needed to find another solution.

So taking the requirements of a product with those sensors, I designed something new, my final concept.

Figure 20, IOT canvas of concept 1 and 2 ▶
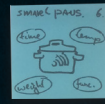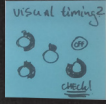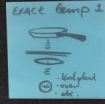
Kitchen Hub

Smart pans

Connects to:

Fridge   Hood   Oven   Stovetop   Tablet   Sous-vide   Elsa   Voice platforms

Sensors:

Temperature   Weight   Time   Motion

Direct notifications:

Temperature too high!   Check appliance (pit1, Oven, etc)   Time for ...   X amount in the pan

Indirect notifications:

Burn prevention   Boiling over prevention   1 2 3 Step / Recipe Suggestions

Settings:

Set temperature   Set time   Weigh off ingredients

New possibilities:

Sous vide cooking   Fast cooking   Play / pause cooking   Voice control

Impact:

Reminders when needed   Precise cooking   Hands off quality time   Always in control

17. FINAL CONCEPT: SJEF

Start of SJEF:

I designed a clip that you would put on your pan, and these would automatically give all notifications to a central device and your phone. By this time the central device was more a small circular screen. The sensors would only track time and temperature and show it when you touch it.
It would prevent problematic situations during cooking. So when something would be cooking over, or temperature was too high or too low.
You would be able to use these sensors on any pan you already own, and start with you connected kitchen cooking experience.

In the next chapter a storyboard is presented to understand how Sjef impacts daily cooking.

Figure 21, First render of Sjef. ▲
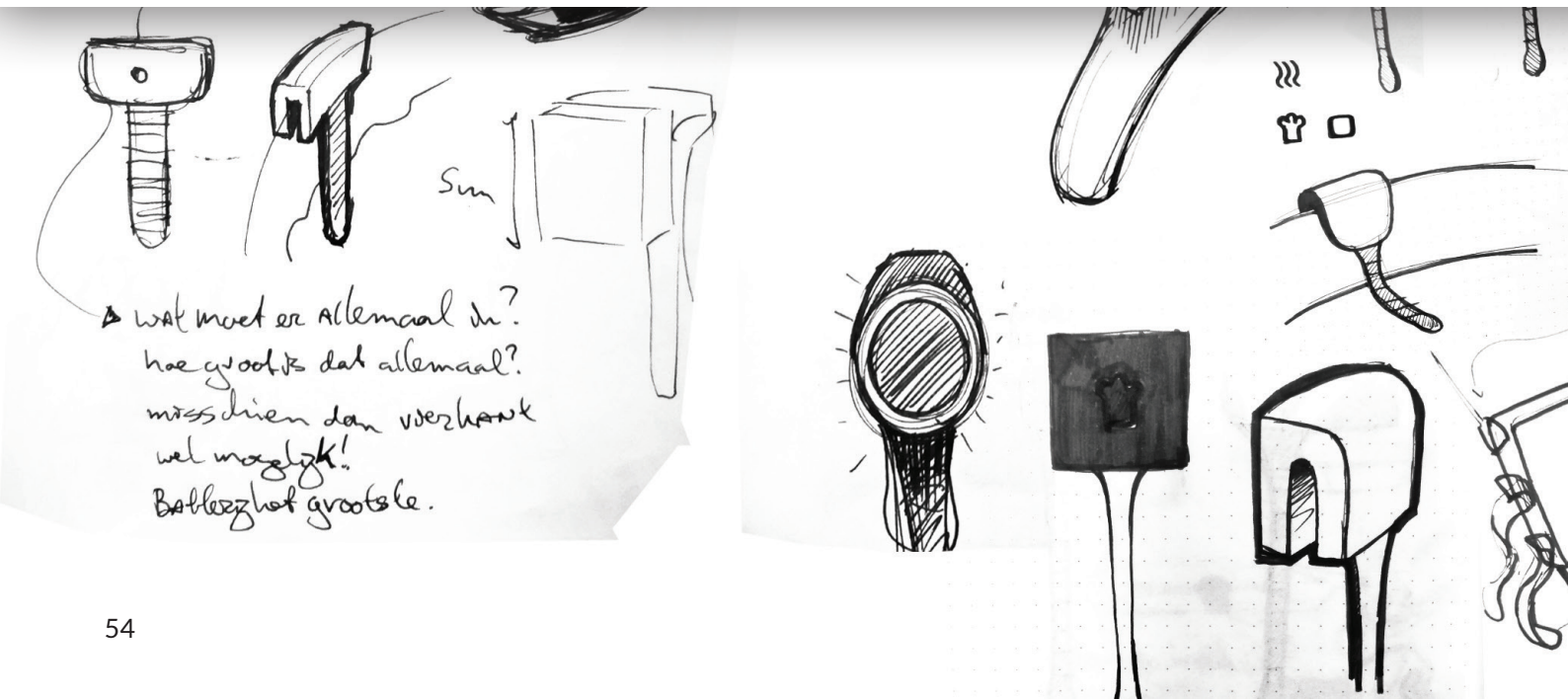
APP Functionality / dedicated device

basic
| time |
| temp |

home.
⊕

set time.
How long?
↑
05 min
↓

new
sensor
put it on
something

slappen
kunnen ook
slim / Automatisch.

SETTINGS/
WHAT?.
🕐 🕐 🔆
+/- reminders?

MESSAGE
○ icon

AWAY mode
doing
stuff
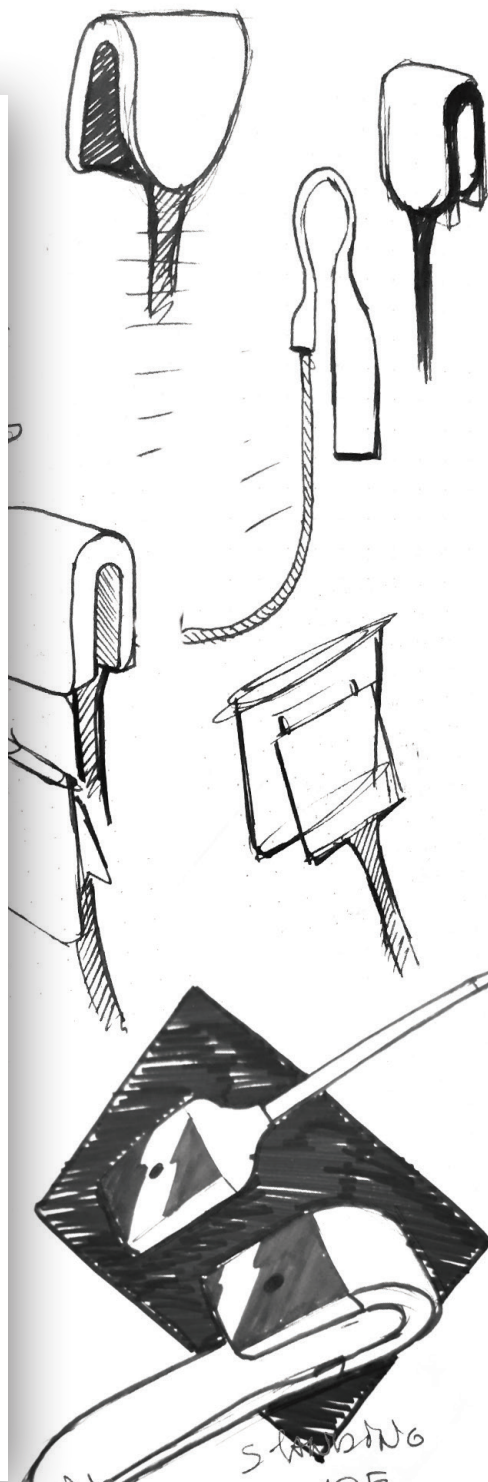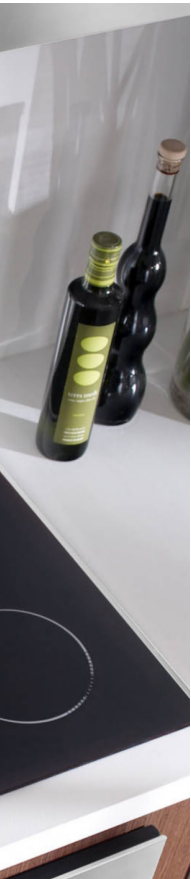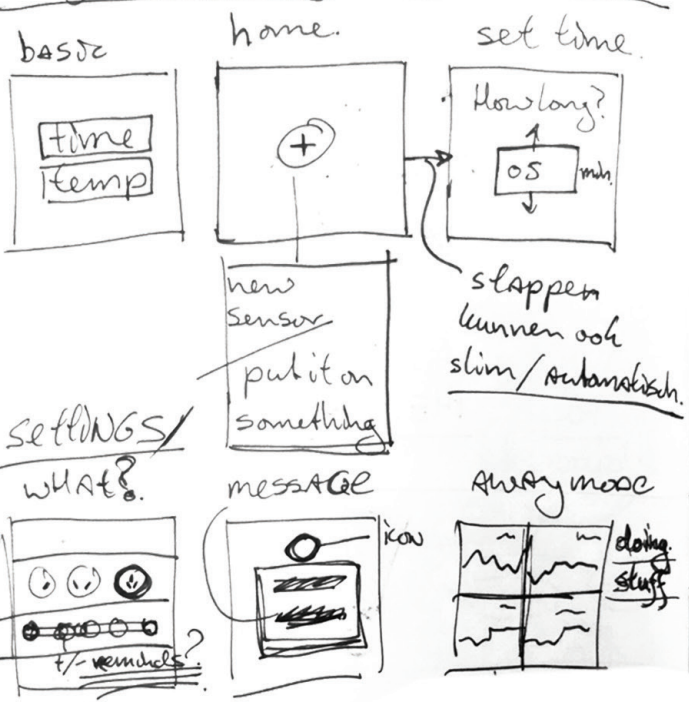
GO!
ADVANCED mode. → elaborate tm illustration.

⊕ → time ⊖ [:] ⊕ count up → temp ⊖ [ ] ⊕ from... to.... →

DRANG AANGEVEN. → vibbelt op lijpje!

fluis ⊖ [ ] ⊕ ⊗ ✓ → reminder ⊖ [ ] ⊕ minuten → sensor [ ] ⊕ → overview → extra.

✓ ⊗ ⊛ yes edit no. → 💾 SAVE!
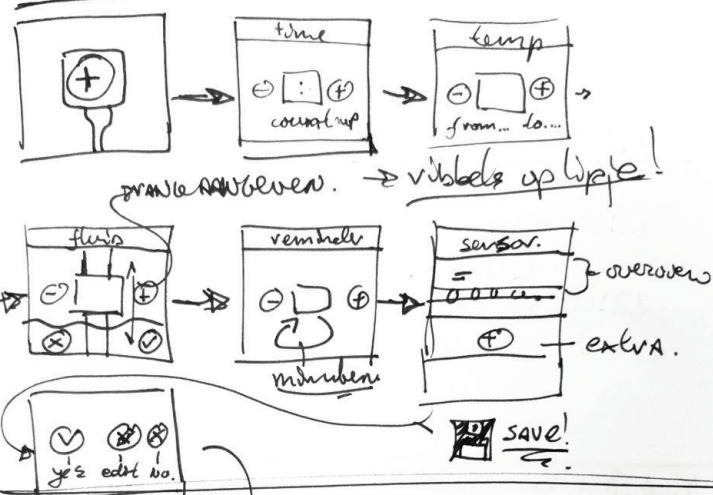
icon.
○○○○○○
○○○○○
○○○○○○
○○○○

— select
ICON
voor
gerecht type.

new ⊕
recent
○○○○○
quick

te los met. 💫

temp + core temp.

103°C
09:13
❄ II ◼ ✕

pause

silent

55
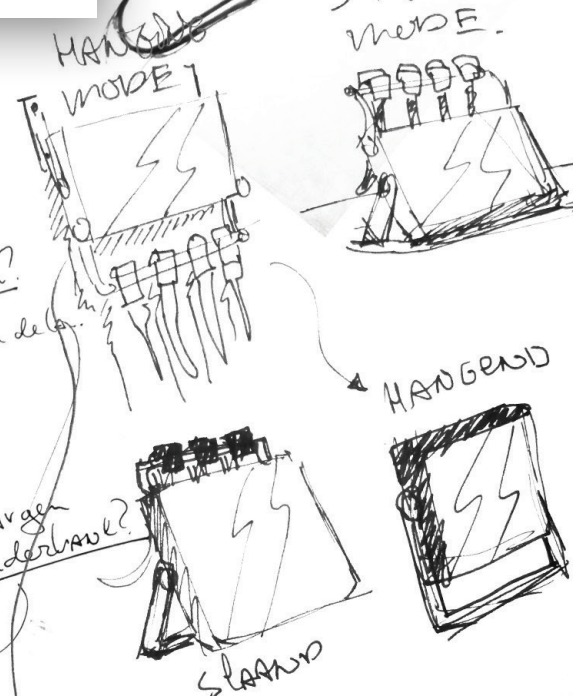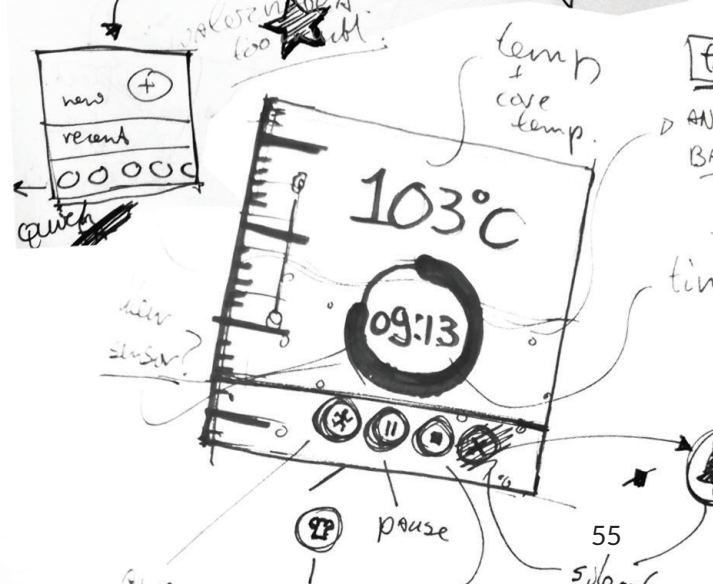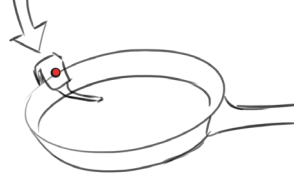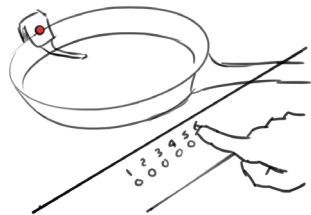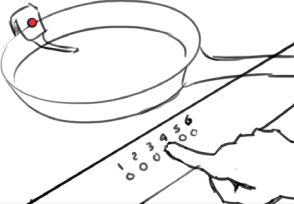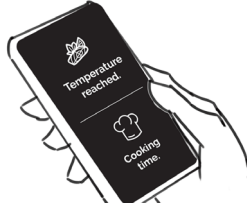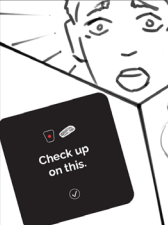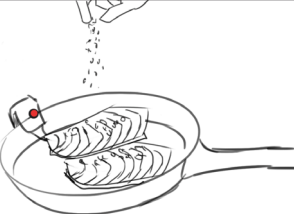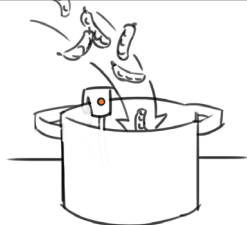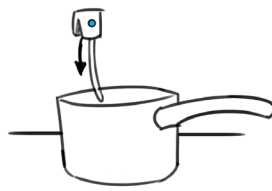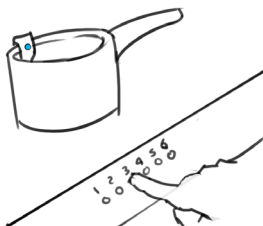
18. STORYBOARD

It was very unclear to me how a product would help in the kitchen, when at what time and how. To design something like that, and to understand what it could do, a storyboard was made, a very elaborate storyboard. The first part was about communicating your dinner to the product, the other was while cooking with the product.

While making this, screens were designed for the storyboard, at the time more wire frames than real interfaces. But these were used later to design the screens with.

Just like other products, this product would need to know what you are making, how you want the food to turn out and the size of the ingredients. Also a setup storyboard, for selecting and creation of the recipe was made, this can be found in appendix 19.

Figure 22, Storyboard of Sjef ▾

Oke lets go! start cooking! oh no wait I still need to prepare quickly.	Fixing up the sauce.	And cut the potatoes!	And clean up this salmon.
Oke lets start cooking!	Allright first I need to put on the yellow sensor for the potatoes.	Set this to max heat, allright.	On 6 here we go.
Ah cool, great, the temp is building up. it actually measures that.	*Few minutes later* Ah time to put them in. hey it's cooking!	Throw this in, cool lets continue with the carrots.	Lets put that on the other pan.
Allright I need to set this als on max heat.	Put the stove to 6.	lets wash them quickly. in the mean-time...	Wow I can already put them in!

And the user puts in carrots into the pan.

Allright now the hard part, the salmon.

Set to: **Med-high heat**

Oke, apparently I need to put this to med high heat. Ill try.

oke high heat right? Lets put it on 6 as well.. Oke seems about right.

This needs less heat

Wow oke, it needs less heat. Ill qcuikly adjust that. I thought I did it right

So lets put it on 4 , that would be better. *TRINGGG* The doorbell rings lets get that!

Cooking time 15'37

Uhm hey there is this walking guy, lets press it. Now it knows I am gone and not in the kitchen

Time to put in the salmon.

The system says its is time to put in the salmon.

The guy is still talking to the neighbor and giving him the package that was delivered at his home.

Temperature reached. Cooking time.

hey neighbor, sorry I need to get back to the kitchen, time for the salmon!

Allright now I put them in, ah leave them for 3 minutes cool. Ow wait the other one for 2 minutes.

* phone rings* hey! no this is a good time for a call (it is not), yeah that thing about work... conversation continues.

Check up on this.

'beep :)' He looks at the device making a sound. hey check up on this! "Ow wait, I need to do something!"Otherwise I

Oke Ill season the fillet with salt and pepper and add to pan, skin side up 6 minutes

Time to put in the peas

Oke hey now it is time to put in the peas.

Ill put those in..

Time to flip.

Allright now I should flip the salmon. That is about right. The other one still needs 30 seconds.

Flipping them both.

Oke now everything needs a few minutes. Lets prepare the sauce. Put in the sensor

Set to: **Medium heat**

ill put the pan on 3.

Oke lets set it to 3.

Time for: Sauce

Now lets put in the sauce!

Done! Enjoy.

Two minutes later, dinner is done! everything is prepared perfectly and at the same time.

The couple is happily enjoying their perfect cooked meal.

19. IMPACT OF SJEF

Now it's clear what Sjef does, this chapter will be about what the exact impact is that Sjef has on the practice of cooking. We will reflect back on the innovation spaces, likes and pain points of the cooking enthusiasts of the interviews and end with what exact the impact is that Sjef has on cooking.

When looking back at the practice models for cooking made after the interviews, there were the following challenges the cooking enthusiasts had in the kitchen:

1. Being uncertain about skills and next steps.
2. Timing overall.
3. Managing the cooking process.
4. Not knowing if the temperature is correct.

Now lets look at what Sjef does, to sum it up:

1. Makes you confident about your skills and next steps by guiding you through recipes.
2. Takes care of timing for you.
3. Gives the user more control over the cooking process.
4. Gives certainty about temperature.

Hypothetically speaking, Sjef could be a solution for solving a lot of these challenges in cooking by using data collected from the sensors and giving actionable insights. And it does all this without taking away the cooking experience from the user, but actually keeps all control to the user but assists them in their cooking.

To rephrase that into one short sentence, this is the impact of Sjef:

"Sjef assures the quality of users' food and gives more control over their cooking, by giving actionable information at the right time."

However Sjef was at this point still a concept and a design based on a lot of assumptions. In order to understand what kind of notifications are valuable for such a product, and if any of the assumptions were valid a usertest was the next thing to be planned.

For this a prototype was made to get as much information on the concept as it is from users. So it needed to simulate the product to the extent that there is an experience of cooking with SJEF.

Figure 23, Impact of Sjef in a practice theory model. ▶

**Being confident about
skills and steps.**

**Being uncertain about
skills and next steps.
(process / recipe)**

*Cooking
(with Sjef)*

Sensors

SJEF

**Check when
necessary.**

**Looking &
Listening to
SJEF**

Improved timing

**Certainty in
temperature.**

**More control over
the cooking process**

**Timing is a
challenge**

Not knowing if the
temperature is correct.
(temperature)

**Managing the
cooking process**

Like / passions.
Dislike / pain points
Challenges

20. VALIDATION PLAN

To be able to test Sjef, a usertest had to be done and for doing that I needed a usertest plan. This chapter will cover that plan, the scope, approach, the test outline and the tools needed in order to perform the right test for this kind of concept and product.

The scope:

The usertest will cover the impact of the product, and will test if the product is able to achieve this hypotheses. Other goals are to discover if the use of cooking with the product gives confidence to the users of the outcome of their cooking as well as about giving them a feeling of control.

Approach:

Main research question project:

- What is the effect on the users' practice of cooking by introducing new data-enabled technology that create, use and present data directly within this context?

Main research questions test:

- Do people feel more in control of their cooking process?
- Do people feel they can reach better quality food when using the product?

Location:

The tests will take place within the weeks of 11 december and 1 january at the homes of the users.

Sessions:

The sessions will take one hour to complete. Therefor the participants were asked 1,5 hours of their time. Before the test I will take 15 minutes to setup everything properly.
The scenario will take 30 minutes in total, with 5 minutes of setting up and 25 minutes of cooking. I will have done the preparations.
The questions will take another 15 minutes to ask.

Participants:

7 people were invited to participate in the test, in the end 5 were able to participate. 5 was the target amount of users to test with since it was based on a study[12] from Nielsen and Landauer (1993), which showed that only 5 participants are sufficient to find 85% of the usability problems in a product.

Usertest outline:

Before the test begins, the users were asked to sign a consent form (appendix 21) One was given to the participant, one I took with me. Then the concept of SJEF was explained to the participant with the help of some images displayed on the ipad. Then they were explained that they were going to cook with SJEF, with the recipe (appendix 22) that is given to them. But before they could start

cooking they have to first give the information to SJEF, and later they can cook with SJEF as an assistant.

Giving information to SJEF:

For giving the information to SJEF, a digital prototype was made with invision to let a user built up their recipe through a low fidelity app.

Cooking with SJEF:

During cooking, a video was displayed that was a wizard of oz version of SJEF. So instead of controlling everything SJEF shows the perfect timeline to cook a certain meal to the user.

Interview:

After testing, the user is asked a series of questions to answer the research questions. These questions are all for getting as much feedback on the concept as possible. The full list of questions you can find in appendix 20.

Tripod

Smartphone

Clip
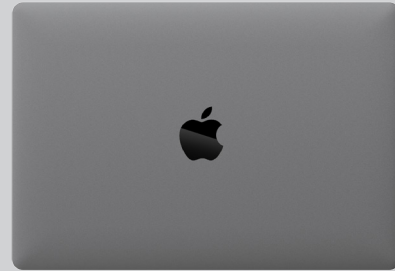
Laptop

Tablet

Ikea Tablet stand

Recipe

Consent form

Interview questions

2 pieces of salmon
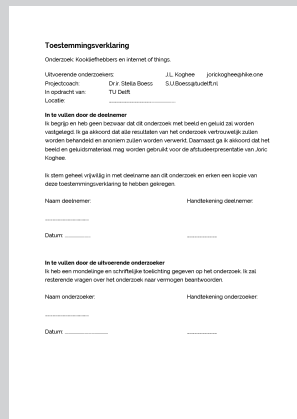
Some broccoli
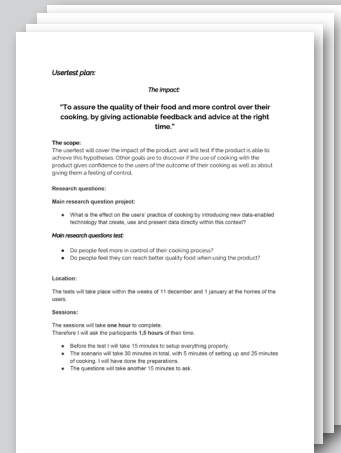
Some potatoes

The prototype:

The prototype consisted of an invision app (figure 26) in which it was possible to create the meal you are making. It was displayed on an ipad during testing. After the user would have created the recipe, the app would be switched with a video of SJEF (figure 27) as if it would be sensing with the sensors and giving notifications according to the recipe.. The video was made with adobe premiere pro and adobe after effects. Visuals were made in illustrator for both the invision app and the video.

Limitations of the prototype:

Since no sensors were made for Sjef, Sjef was unable to sense anything. The timing therefore could be off from the real situation since this part of the prototype was not controlled. The reason to develop the concept like this was to show Sjef is high fidelity as possible, to get the most feedback on the concept as a whole. The goal was to generate as much information about the concept to develop it further.

Figure 25, the Sjef prototype on the counter.

Figure 26, Sjef invision prototype screens. ▼
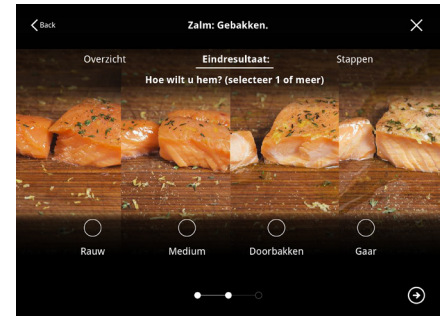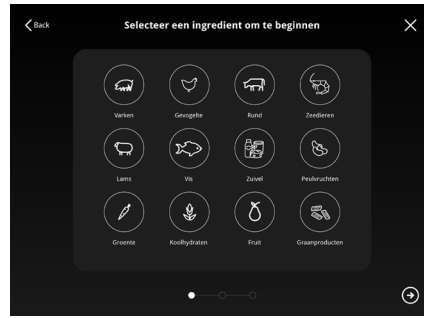
Loading screen.
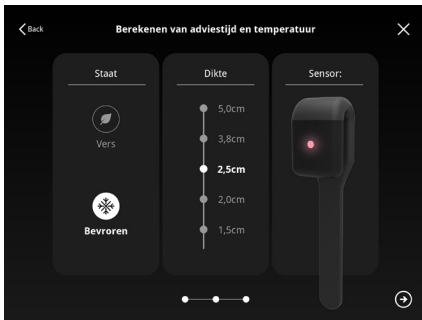
Selection of ingredients
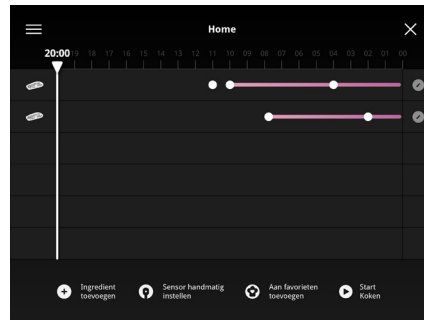
Selecting a salmons done-ness
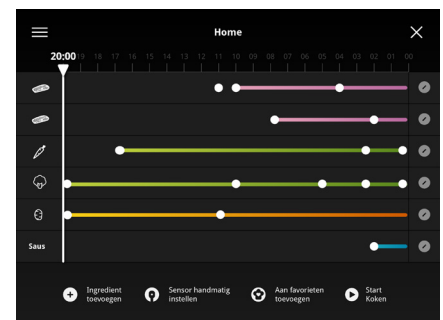
Adding a sensor

Salmon on the timeline
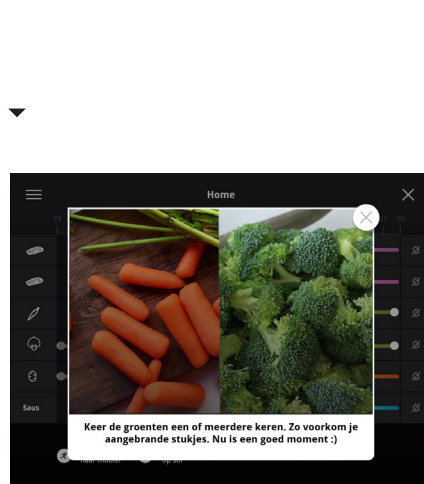
The completed timeline

Figure 27, Sjef video screen samples. ▼
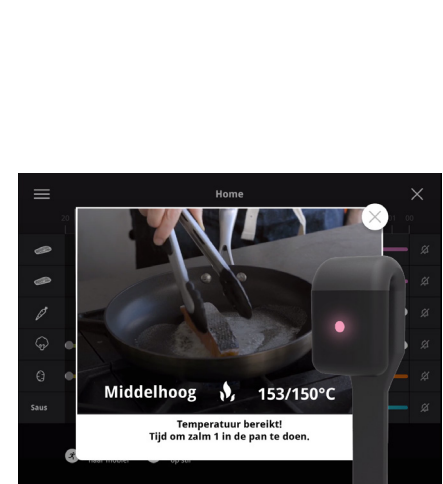
Notification of putting on the stove to high heat.

Reminder to turn the vegetables.

Notification to show temperature is reached.
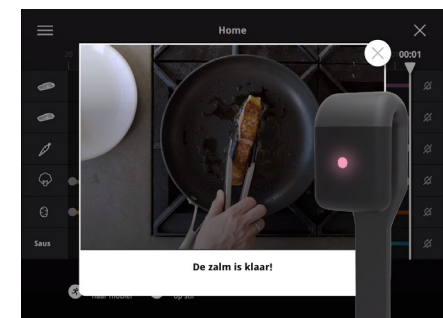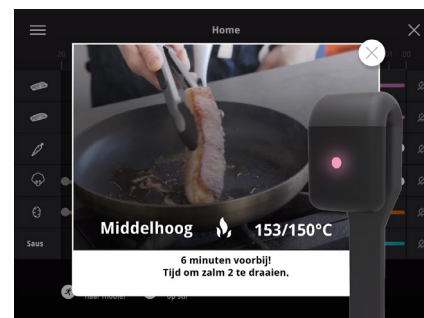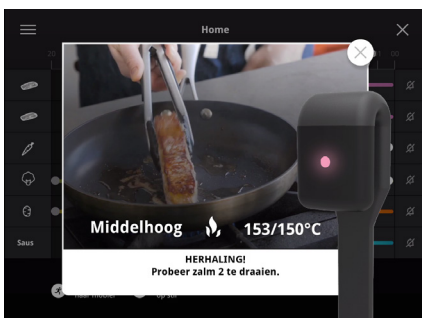
Reminder to turn the salmon.

Normal notification to turn the salmon.

Notification the salmon is done.
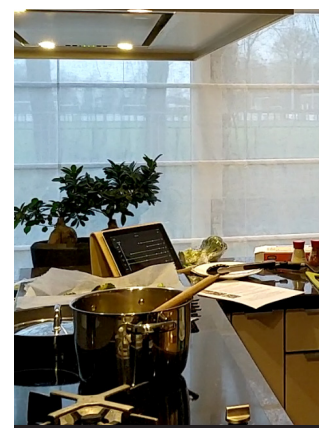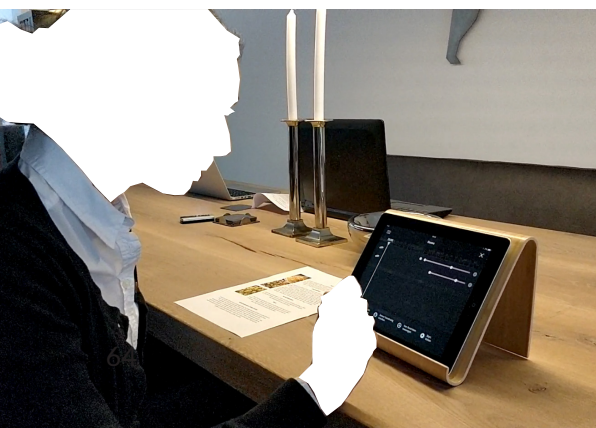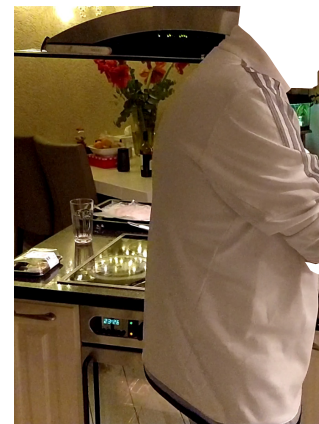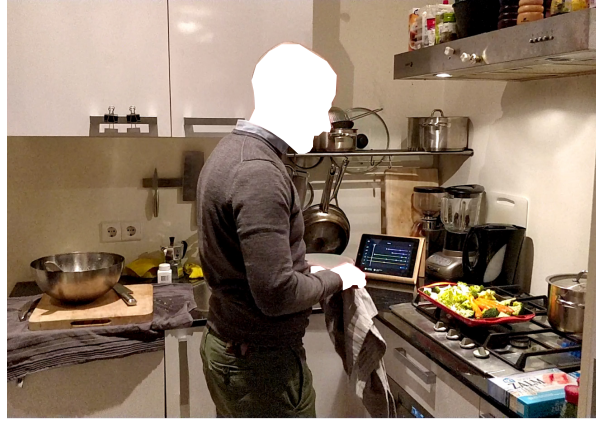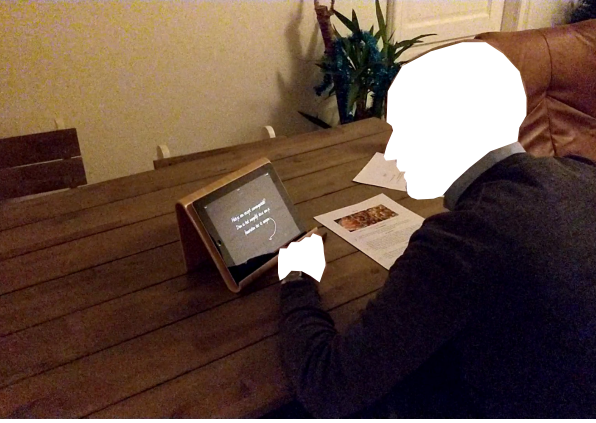
21. TEST ANALYSIS

On the left you can see the validation tests being done at five users homes where they experienced cooking with Sjef.

This page shows a summary all the feedback received on the concept. The feedback is divided into the categories, Impact of Sjef, the recipe creation, notifications and materialization. For all the feedback, visit appendix 23.

Impact of Sjef:
Users experienced that when using Sjef, their daily timing would improve.
Since Sjef is constantly paying attention, it requires users less amount of thinking that they would normally have to do, users are more relaxed with cooking since Sjef is focusing on that all the time. Because of this, Sjef makes cooking easier. "I don't have to think when something needs to be done, I only have to follow the recipe and what it says."

Sjef would prevent them from making any mistakes. And because of both of these factors, it helps with making the quality better. Since it allows you to be ready at the right time, without forgetting an ingredient or having to put a part of a dish on the side. Like on of the users said, "you don't want to have a cold steak because you are waiting for the potatoes." It therefore solves the big challenge of cooking to make sure everything is finished at the right time.

Recipe creation:
The way of selecting your recipe now is too complex, takes too much time on a daily basis and too elaborate. It took some participants 10 minutes to make their recipe that time, which was fairly simple. They did not see them creating their recipe each and every day like that on a device. Participants expected SJEF to have a database of recipes which would be combined with a partner company or website. As partners the participants talked about Hello Fresh, Albert Heijn, Jaime Oliver, Marleyspoon, Smulweb and others. This way the user can select a meal quickly and start cooking instantly, instead of selecting and creating their recipe on the spot.

Notifications:
Participants were positive about the visual styling of Sjef, is was clear and professional.
The notifications were clear because they were very visual, supported with video. They almost did not need the text to understand what was going on. During cooking some of the user has a more loud or more quiet kitchen. This caused problems for some when some of the notifications were missed because the sound of the notifications was too soft.
What participants were missing was to get notifications about for example to set a pan for the next step, to prepare, or to clean your kitchen, those kind of things.
They also were missing the information about what tasks are coming up, a good overview of all tasks in the beginning somehow was expected. They were very unsure about what it would be saying all the time.

Materialization:
It would be very nice to be precise in temperature and especially be beneficial when preparing meat. Participants think that the sensors would be a great tool to be more certain during cooking and be confident about their cooking. The amount of money they were willing to spend on the sensors was very low. They would rather spend more money on pans with integrated sensors than spend a big amount of money on sensors.

◀ Figure 28, Validation participants.

22. EVALUATION:

Main research question project:
What is the effect on the users' practice of cooking by introducing new data-enabled technology that create, use and present data directly within this context?

Though this research question was written much earlier then Sjef was designed, Sjef can actually be described as a data-enabled technology that creates, uses and presents data directly with the context of the kitchen.

The effect of Sjef on the participants was in general not that they felt more in control over their cooking process. However they all agreed that this was because of limitations of the prototype. The prototype was too simple to test this properly and reviewing it now was not the best option.
A better prototype would be one that I would be able to control over distance, so it would be timed much better. However the prototype was very sufficient in creating the experience of cooking with such a product like Sjef.

When interviewing and talking about the concept of Sjef the participants were confident that their timing could potentially improve over the long term when using the product on a daily basis.

Some of the participants even said that the reminders helped in the test cooking session with Sjef, and very much appreciated the reminders it gave. The participants on average were not interested in Sjef because they did not need the guidance and extra control it gives. They did all agree that for the majority of people, Sjef would be a great tool to learn to cook and to reach better results.

With the addition of users sensors in their pans they would be able to be precise in temperature and therefore be more precise in their cooking. They were hesitant to say if that would increase their results.

Main research questions test:
Do people feel more in control of their cooking process?

The smart notifications of the recipe by Sjef was experienced as giving extra control over the cooking process. Being reminded often to do certain actions, knowing and seeing how long they need to do what helped with timing.
The participants were also excited about the temperature sensing in a fully working Sjef since right now they do this by feeling. Being able to get more information about what is a good temperature for what would be interesting to see how that would influence their end result.

Do people feel they can reach better quality food when using the product?

For everyday meals they did not think it would improve quality much, but they were certain Sjef would help in reaching better quality food when making new recipes requiring new steps, techniques or ingredients.
But this was for the participants, which were above average home cooks, everyone agreed that this tool would be a great benefit for people who are less skilled in, or even have no experience with, cooking.

23. FINAL DESIGN

With all the data from the user tests, Sjef was able to be designed one step further. This chapter presents the final design of Sjef.

This spread shows the Sjef with all the adjustments from the usertest. On the top tablet the loading screen with the logo of Sjef is shown, underneath the partners are shown such as Jaime Oliver, Albert Heijn, Hello Fresh. For ATAG these brands seems the most logical to connect to since they are big resources for recipes and even home brought meals.

The second tablet shows an overview of all the recipes from partners. With Sjef it is now possible to save recipes from these sources and add those recipes to Sjef. No need to fill everything out yourself anymore, with Sjef all recipes are already in there, you just have to find them.

The most promising partner seems to be something like Hello Fresh, since they already supply people with groceries, and since HelloFresh knows what kind of groceries will be brought when, and the specifics of the ingredients. Sjef could then know everything up front, and the user could instantly start with cooking.
Making something a little different? Sjef is easily adjusted by selecting that particular ingredient allowing to give guidance to the user in any case.

The third tablet shows how the redesigned screen of Sjef would look like during cooking. Here it is possible to scroll from the top to the bottom, get an instant overview of the whole recipe. This allows the user now to quickly go over the whole recipe in the beginning, before starting to cook, but also skip ahead of time during cooking. At the same time Sjef already helps you plan your cooking by not only showing your current task but also the task that is coming up.

Since the users were very satisfied with the visual style, as well as the video notifications, this remained close to that was made for the prototype. The overview of recipes was made in white instead of black because many of these websites / sources are white and this makes it familiar to the user.

The sensors also had a redesign, where before the light indicator was on the side of the clip, the light indicator is now on the top. The indicator is on a curved surface so it has a wide angle on which it can be seen.
In contrast to the previous version where, when clipping it onto a baking pan, the light would shine down and the user could have a hard time seeing the light on the sensor. Though this was not tested, it seems like a better alternative.

Sjef is a product that works on any stove top and in combination with it's app is able to assist any home cook in their kitchen. During cooking Sjef guides the user through their cooking and senses whether or not they completed the step. If it cannot sense this, Sjef will ask whether they are done or not. If not completed, Sjef simply adjust the current planning if necessary. Sjef gives all the advice it can give to help you cook the recipe the best way by assisting you, looking after your timing and cooking process, and advising in temperature settings. So when you are distracted during cooking, Sjef will allow you to be focused on what is really important, sharing a culinary experience with the ones you love.

Figure 29, Render of Sjef with the final screens and the sensors on a table.

24. TECHNICAL DETAILS

This chapter of the final design will cover what technical requirements are needed for the app to make sure Sjef has the impact it aims to have, and what kind of components and sensors are in the sensor to enable Sjef's functionality.

The app:

The app has to be responsive for all devices supported, Android and IOS, the biggest user groups of mobile devices. It has to be connected to the wifi of the home, as well as to the sensors themselves.

With the future of internet of things it is very likely that Sjef will need to be connected to other devices in the future as well.

Connecting to a stovetop allows Sjef and it's sensors to do new functions, which requires all kinds of new design tasks for the app. In terms of functionality this allows users to do Sous vide cooking for example.

Continuous app development for such a device such as Sjef should be taken into account to make sure Sjef has a long product lifetime.

Led indicator

**Modular
Connection
Module**

Vibration sensor

Flexible

Temperature sensor
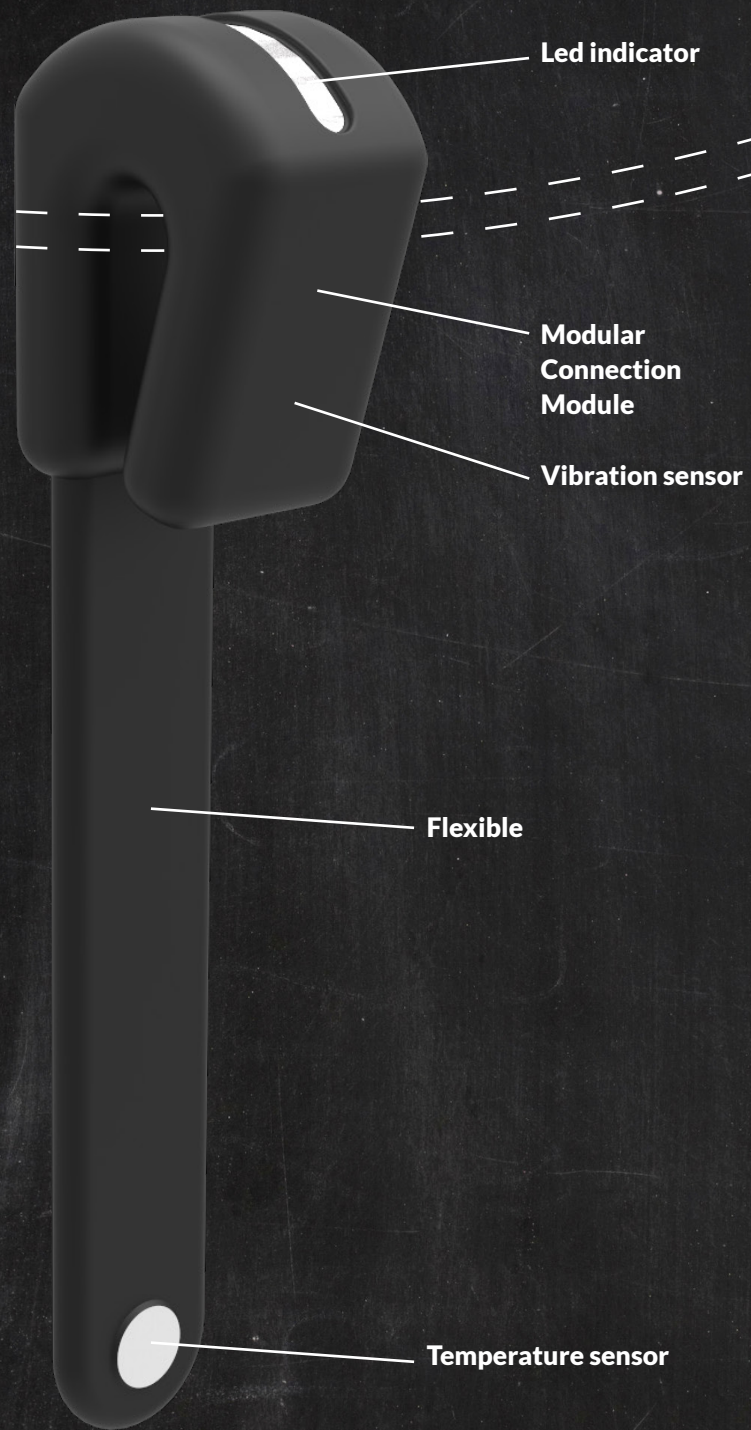
The sensors:

The sensors of Sjef work in a high temperature environment, therefore the components are protected with a temperature resistant casing. They have an LED indicator on top, to show what sensor is used for what part of the dish.

Inside of the casing there is a module which holds the battery, and the wireless connectivity chip to make sure the necessary information from the sensor is communicated to the SJEF app.

This module also has a vibation sensor in it, to sense any activity on or in the pan. This is necessary to give certain notifications such as lacking attention of forgetting a step of the recipe.

Finally the bottom of the sensor there is the temperature sensor to sense the temperature in the pan.
The lower part of the sensor is flexible so it fits the shape of the pan.

The sensor needs a way of staying onto the pan properly, for Sjef a clip was designed so it would stick to a pan.

▲ Figure 30, Render of a Sjef sensor.

25. RECOMMENDATIONS

From a project without a clear starting point to a tested prototype Sjef, the product still has a long journey ahead of itself in order to become realistic. Therefore this chapter discusses what is recommended in order to develop Sjef in the future, and what was not possible within the course of the graduation project.
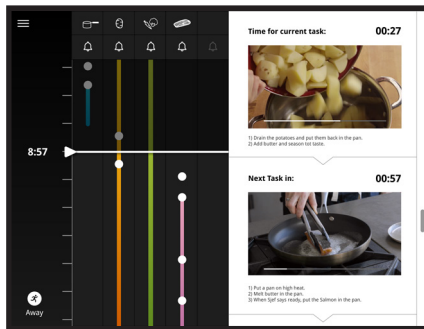
App:
The redesign of the app includes a lot of new elements which need testing on their own.

For the final design the decision was made to include partners for a database with recipes to select. The recipe selection should be tested to find out how to easily customize the recipe to the specific changes the user might have in mind for the ingredients (such as the size of the salmon for example).

For Sjef to work it is necessary to find out what is a good partners to built a platform which is attractive to use in combination with Sjef.

For the functionality of Sjef, and as previously mentioned, a service like Hello Fresh would be perfect since already a lot of information is known about the food which is going to be cooked.

The app on it's own can be viewed as a playground and a research opportunity to experiment with new functions in connected cooking in the kitchen. The sensors can give a lot of data to ATAG and Hike One for developing Sjef further, or developing another product because

of the collected data.

Sensor:
Since the prototype was tested without sensors, and it is a big part of the concept, it is necessary to test cooking with sensor in pan with users. Though none of the users had anything against it, they did not experience cooking with such a sensor on and in their pan. Therefore a prototype would need to be created to test this experience but also to test the added functionality of sensing the temperature to find out more about how worthwhile it is to develop such a sensor.

Testing on it's own already gives insights how such an app would combine well with also smart appliances or smart pans, which in the end could also be part of such a ecosystem where recipes are connected to kitchen products.

During the graduation project it was not the aim to work out the sensor in full technical detail, with exact components and costs. What kind of materials, exact components, and what kind of wireless technology are still things that were not covered.

Though this was not researched and developed in detail, the sensors are very feasible, since there are already similar kind of products on the market that have these functionalities that the sensors have. Such as the sensor the Paragon is using, from a kickstarter project.

Materialization & pricing
When comparing the pricing of comparable products, the sensors have shown to be more expensive than initially assumed throughout the project. It was assumed that users would rather spend some money on a sensor than purchasing a complete new set of pots and pans with fitted sensors in them. However the research of the validation of the concept showed that people were not likely to spend much money on such sensors, but would rather like to spend more on pots and pans.
Though only five people were asked to give input, it should be researched further in order to make a well grounded decision.

Therefore it is worthwhile to assess whether or not it makes sense to develop sensors or actually develop pans that are integrated with such technologies. Pricing of

such sensors would have to be low enough for people to buy them, which currently is much lower than the production cost of such a sensor. Since comparable products such as the Paragon, Meld, or Gorenje's IQcook cost between 100 -150 euro.
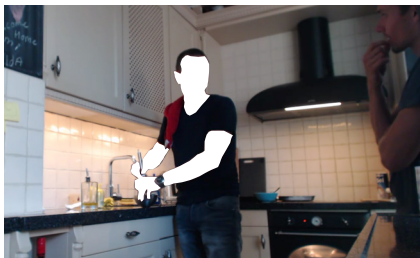
Target group:

The original target group in mind for the project were cooking enthusiasts. Which are people who are good at cooking and like to cook. Sjef turns out to be a product more fitted for the masses. For people who like cooking but necessary are not good at it. It is more for people who want to make nice food, without putting in the effort of learning a new skill, or want to be assisted in learning the art of cooking.

I strongly suggest testing the concept again with a target group that is actually not skilled in cooking, or average in cooking to find out how helpful and interesting such a product is for them. If they find it already more valuable then people who are good at cooking, it is likely these people are also willing to spend extra money on the product. This could very much influence the pricing of the product as well as the business model.

During testing, people who were generally less skilled in cooking saw more benefit and were more positive in general about Sjef compared to people who are skilled or professional in cooking.
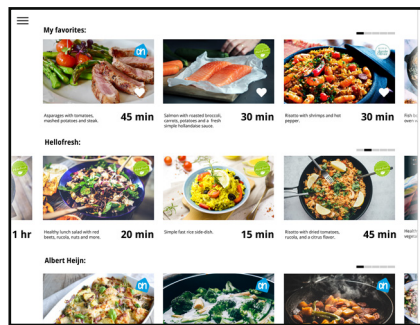
Recipes:

As mentioned before, a partner should be found to get to a good database of recipes that Sjef would be able to use.

This database would have to be supported with all kinds of data and videos to make Sjef working at its best.

In the end it might be the case that pictures are sufficient as well. But since many of these recipe based websites are already moving towards videos, it is likely that implementing video is a logical choice.

Business:

The project was not focused on developing a business plan for connected products in the kitchen. Therefore the business part of the product remains to be designed and researched. Whatever the business plan will be, I can recommend partnering up with a food / recipe / grocery service, ATAG and Hike One will need to find a partner when going in any of the previously mentioned directions.

Overall:

Sjef has a long way to go, and working on such a project showed that developing anything IoT related in the kitchen requires a lot of competencies to work together. When developing a product in the context of the kitchen, especially with pans on the stovetop, it requires recipes, data, kitchen manufacturers, interaction designers, visual designer and content creators to work together.

However users now show a positive signal towards connected cooking and a product such as Sjef could definitely be interested for a big audience.

26. REFLECTIONS

It were an intense couple of months working on this project but it was a big and fun challenge. In this chapter I want to talk about what I learned throughout the project.

Research.
The project was focused for a big part on user research. The approach I chose to have on researching for this context was something I really enjoyed. It was a great experience going to the homes of people I did not know and interview them to get the knowledge I needed. It required me to look further than my own contacts to find people as close as possible to the desired target group. I learned that it is very possible to find a lot of people quickly, though I still have much to learn about planning these tests properly and efficiently. The main reason I needed extra time for the project was because of delayed test dates.

Also after doing testing and validating Sjef at the homes of people, I still strongly believe that the best way to test a product and gain the most insights is to experience it. I would love to iterate on it and continue to refine the concept. However I could have done a better job at developing a prototype.

It was also very nice to learn some new theory in the end of my Master's. Practice theory proved as an effective tool to map and understand a context and the people in it. I hope that it also helped explain my steps from the beginning until the end of the project. For me the model makes for a clear overview of what you are designing in and who you are designing for.

Another thing I learned to do and

that helped a lot was the IOT canvas. Since this showed a systematic way of analyzing what is actually the core of your product in order to achieve the desired impact. Personally I have a big interest in IOT and this methods of stepping back an analyzing is hopefully something I can take into future projects.

Satisfying clients.
What was new for me in this project was talking to so many stakeholders. When doing a project, even though it is a graduation project, you try to keep all stakeholders happy. It was a challenge to take into the feedback of all parties involved and at one point I had to decide what was more important and what was less important.
Overall a nice experience into dealing with multiple stakeholders.

Developing the concept:
The concept of Sjef was prototyped in a short amount of time and this had also limitations on testing.
Overall the prototype gave the amount of insights needed to further develop the concept. However more feedback could have been gained if more time was spend on developing a better prototype. I could have made it less high fidelity and more functional to test the experience better.

Validating Sjef:
Overall the tests went well. The participants were able to experience, understand the concept and generatively think about how

this would work fully functionally and what it would need to be a successful product.

But at the same time the prototype had its limitations. Since Sjef is primarily tested as an app, the sensors and many of its core functionality was not properly tested.

The project reminded me to keep a critical eye on my own planning and reminds me to keep thinking about what is necessary to make in order to answer research questions that I have. With the pressure of time this stays a challenge, but I hope to improve on this over time.

Overall:
Developing Sjef for Hike One and ATAG and the TU Delft has been a very fun project where I was able to show how IOT can have an impact in the kitchen context. I hope that the outcome of the project is beneficial for all the parties that were involved, and to some extent gives inspiration, knowledge and direction to the future of IOT in the kitchen.

I had very much fun, and I would like to thank you for reading all of my report. I hope you liked it and thank you for your time.

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27. APPENDIX

1. Brand hierarchy & focus:

gorenje *Life Simplified*

Mother brand of ATAG
and the other brands.

ETNA
KEUKENAPPARATUUR

Pelgrim
Mooi makkeliik

ATAG
we love to cook

ASKO
Inspired by Scandinavia

Low segment and cheapest kitchen appliances.

Middle segment kitchen appliances.

Premium kitchen appliances.

Premium brand with Scandinavian roots.
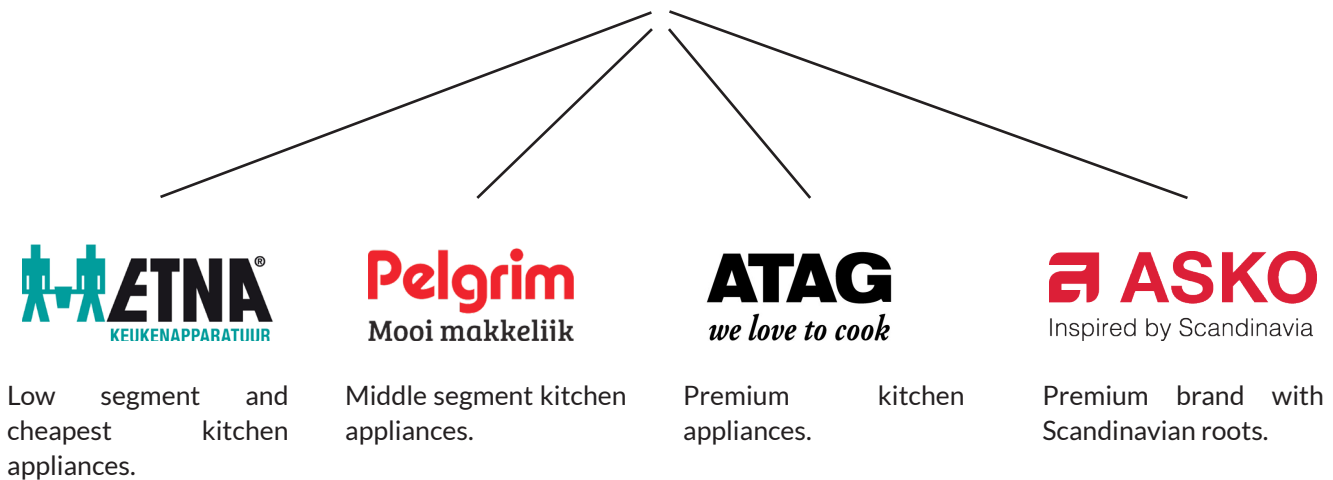
2. SWOT-Analysis:

STRENGTHS

ATAG produces high quality products, with high end materials and professional finish.
The products they make are close to professional, allowing anyone in their home to use tools that are close to that professional cooks. But they also have sub brands that fit target groups that have less to spend on a kitchen. Meanwhile they are part of a bigger brand: Gorenje. One big difference between ATAG and Gorenje is that Gorenje is about making an easier cooking experience, while ATAG is about supporting the user in it's cooking experience. The strength of ATAG is about focusing on a niche market, rather than the big chunk of consumers everybody is focusing on.

WEAKNESSES

The products are, so it seems, limited to the Netherlands. The market they have is small, since the costs are so high. The products are of high professional level, but a huge investment. They are not really helping out in the way cooking is done, there is not much that gives the user an unique extra sense of control over other cheaper appliances other than performance.

OPPORTUNITIES

Opportunities would lie in creating products that actually give more control to the consumer. Taking advantage of this niche market where people want to cook traditionally and dominate this part of the market. Letting them control the appliances more and let them be in control. On the other end other opportunities could lie in taking over cooking tasks and facilitating the complete process of one part of the dish, so the consumer can focus on something else. Important is to get a good understanding of the user's life in order to design a rich interaction that is worthwhile in comparison to its competitors.
ATAG already took first steps into this direction with their kitchen concepts of 2017 and the Kitchen connect Concept video of 2016.

THREATS

While ATAG is being high in quality, interaction and experience remain subjects of the design that are still to be released. Startups are coming from left and right entering the market, with new intelligent ways of doing activities in the kitchen. It is only a matter of time before the competition catches up. Other brands are connecting their devices to the internet and ATAG will soon follow. Since the other brands are bigger and better in technological point of view, the place ATAG can make a big difference is the focus on interaction.

FOOD TRENDS

Introduction:

The following list is a collection of trends that are expected to emerge in the future. Some are contradictory, but as many things in the world, these coexist. Creating this overview of future trends helps in developing a correct vision of the future. This overview is made through the analysis of different technological trends, social trends, and societal developments. These trends are important to understand what could be potential influencing effects on the kitchen environment. This page gives an overview of the different trends related to food and therefore also the kitchen environment. In the conclusion we analyse what factors are important to take into account with respect to the target group.

1. Taste, Flavor and satisfaction:

"Satisfaction is about eating together. Social factor of food gains importance."

The first trend is about the pleasure of taste. This is expressed by achieving satisfaction and fulfillment through a culinary experience. But it does not end here, flavor and satisfaction go together with being and eating together and sharing food, conviviality and appreciating catching up with one another. Food has cultural value, because of preparation technique and nutrition but also in the way we eat. Meals will be about time to have fun

and to be social. We gain pleasure out of eating food with a lot of flavor and this also syncs well with the social aspect of satisfaction. (reference Birelli)
This trend can be seen already today by the vast intake of the very tasteful fast food.

2. Caring for health.

"Health is more important than ever, people will increasingly track what they eat and what they need to eat and prepare how the need to eat."

Food has always been a concern for the health of all species. Despite man's social or economic position, people have always kept an eye on the effects of food on one's health. It is important on an individual level but at the same time on national and global level. There is an increase in research on the topic to for example increase life expectancy. At the same time, the effect of increased number of elderly has resulted in governments and industries to find ways to decrease healthcare costs by researching healthier lifestyles and food intake. Next to this the amount of people being overweight, or having metabolic disorders is only growing. Is is a fact that a correct lifestyle and diet effectively decreases the amount of diseases and mental health and well-being.
Current trends show that people are more and more conscious of their food intake. This is not only for sensory and emotional pleasure

but also to preserve physical health. Food that fits these requirements are functional foods: : a food that, aside from its nutritional effects, has a beneficial effect on one or more bodily functions (a relevant benefit which improves the state of health or well-being and/or reduces the risk of disease) and is eaten within a normal dietary regimen is defined as functional.(REFERENCE 9)

Important for many people for this trend to work is to make the healthier choice the easiest one.

Like Michiel Bekker of Google does for its employees.
http://futurefood.network/the-future-of-food-ten-trends-in-food-sustainability/

Conscious / transparent food.

http://www.morethanmayo.com/foodtrends-2017/
This generation wants to eat consciously. No additives, non-processed. Real food. No waste. They want to know where a product comes from, what it contains and consciously choose which products they eat or don't eat. Vegetables are already playing the leading role on the plate more and more. Our comfort food is evolving from fatty snacks to a healthy veggie bowl with which we cocoon on the couch and we can eat on your lap at ease. Flexitarians (with some meat in their diets, but not every day) are new standard. The development of plant-based and in vitro meat is

going on and on and these products will replace at least half of the real meat on the shelves. The meat we do eat will be a delicacy of good quality and good origen. The attention for the individual product is increasing (just look at the number of startups that focuses on one product and the single item restaurants). Conscious is the new 'obsessed'; we're going to let the extreme eating patterns behind us and go back to eating in variation and moderation. People will be cooking more themselves. A lot of innovation is going on in kitchens to make that a lot easier.

Food-related platforms:

With the growth of conscious food consumption, food related platforms and apps appear. Fooducate inform about the nutritional value of your food. Lose it / Snap it makes it easy for everyone to track their food intake. There even are products now that analyze the food and detect any harmful ingredients.

Fooducate
Lose it / Snap it./myfitnesspal
https://www.loseit.com/snapit/

3. Traditional cooking.

Though new innovations will emerge, traditional way of cooking will also remain as a counter movement.

Food is something precious in culture, we share it and cherish it. We remember culinary traditions and appreciate them. These memories are created from a collection of flavors, dishes, tasks, farming rituals, exchanges and industrial realities. (REFERENCE12) Food is very personal linked to people's personal culinary habits and origin. People might see the food as they know it today as nostalgic, which in turn could result in a trend that embraces

the old way of cooking and eating. In a time that is faster and more stressful than ever, why not have an activity that gets back into the simple secure relaxing environment they knew? (REFERENCE 15)

4. Insects as food. / food alternatives

Because of new regulations and increasingly better transportation possibilities, more foods will go global. So do insects, which could become part of our diet in the future.

Innovation in food has always been about the invention of new foods, dishes and culinary styles. Concerns that are currently asking for new foods concern issues such as increase of price of food, overpopulation of the earth (food scarcity and overflow), environmental issues, etcetera. Other areas of future orientation come from the growing attention to the creation of foods that replace current foods. In 2008, FAO stated that: "Although the idea of eating insects may appear unusual to some people, it must be said that their consumption by human beings is actually fairly common in many parts of the world. In 36 African countries at least 527 different species are eaten, and this also occurs in 29 Asian countries and in 23 countries in the Americas."(REFERENCE 17). Even the netherlands taking this very serious by investing a million euro's into research.http://www. bbc.com/news/magazine-18813075 Other than insects, algae are also possibly introduced into our daily diet. At the same time there are also the artificial meats and the 3d printed foods that could potentially be grown from home. If society wishes to maintain and preserve current culinary traditions and not contribute to the loss of foods historic and cultural value, new developments are required to coexist with what exists now. Besides this, new sensory experiences, thus

new food, can often be experienced as frightening and not necessarily pleasurable.

5. Food production technology.

As the consumers gets more critical, all food production will get better too. More and better food will emerge, healthier alternatives and lab grown foods.

The technologies that are part of this have been developed to improve the quality of food, shelf life, flavor and appearance. To do so traditional knowledge is used in combination with the newest scientific expertise. (21 REFERENCE). The agrifood industry is under constant demand for the request of the increasing critical and demanding consumer. (22., REFERENCE)
Another trend is the development, creation and production of functional foods. These innovations have functional benefits such as improve brain functioning, prevent aging, combat fatigue etcetera. (23 REFERENCE)
Other technologies are developed to speed up purchasing procedures, food preparation for more convenience. But also for the control of preserving food quality, and identify potential harmful products for consumers health.

Lab-grown foods & alternatives

A major breakthrough in the food industry are the lab-grown foods. Lab grown beef was made from muscle cells of livestock in London in 2013. Beyond Meat and Hampton Creek developed a meat replacement with the same nutritional value as regular meat, with plant based substitutes. Finally a new food that is expected to grow are insect, which are good meat replacement and could be making their way into our kitchen.

In vitro meat / cultured meat.

http://eu.biomedical.panasonic-healthcare.com/in-vitro-meat-project-maastricht-university-mco-19m/mco-80ic

Plant based meat:
http://beyondmeat.com/products

Insects: https://www.dezeen.com/2017/06/27/livin-farms-benchtop-insect-farm-intended-make-mealworms-part-everyday-diet-design/

Food 3D-printers
Multiple companies are experimenting with 3d printing food. There is for example Hershey's, which created a chocolate machine that printed dark, milk or white cholocate.

Chloe Rutzerveld: Edible growth, digestive food.
http://www.chloerutzerveld.com/
Hersey chocolate printer:
https://techcrunch.com/2015/09/16/likeachocolateselfie/

6. Naturalness.

Food can be made more close to home in the future. The least amount of handling and technology could also become important to eating healthy.

Food actually is not natural, it is cultural. Mankind uses specific techniques that makes food the food as we know it today. Nature has become culture. (reference 25)
The concept of naturalness as a trend would be the production of food with the least amount of handling and technology involved in all phases of the production chain with extra focus on agricultural models (reference 26).
The creation and production of food could be on industrial level but also on a personal level.

7. Globalization of flavors.

The growing mobility makes the kitchen broader over the world, increasing the culinary landscape. Influencing what you need in the kitchen.

With the growing mobility and desire to discover new cultures, so grew the cuisine everywhere. The global economy has and is changing the culinary landscape. This also leads to new dishes because of exchanging and mixing recipes to create new and unusual combinations. The trend could potentially mean globalization of flavors and is the opposite of the next trend: local and regional food. (reference 32).

8. Local and regional food.

Foods can grow locally and be distributed more efficiently than ever. This will allow people to eat what grows near to them.

Closely related to the naturalness, local and regional food are expected to increase. Food will come from places closer to home, guaranteeing authenticity. Doing so contributes to environmental issues and promotes regional food productions. In return the consumer gets fresh, healthy and seasonal products. (reference 34).
From the geography of taste by professor Montanari: "'eating geographically,' knowing or expressing a territory's culture through a cuisine, some products, some recipes, seems absolutely 'natural' to us."(REFERENCE 36)
Local food is also capable of "telling a story" and this story does not solely refer to nature and the preparation of a specific food, but also to the culture and traditions of the place of origin and the people involved in its production. (REFERENCE 37\)
Food, in fact, is to be considered the "mirror of our history, a lens that shows what we are and what we are

becoming." (REFERENCE 38)
Limits of this trend is that it is a niche market, because of few consumers actually in contact with the production.

9. Luxury food.

As new foods emerge, so will luxury food also grow in authenticity, naturalness, taste.

Some consumers are willing to pay more than average to buy products that meet requirements of authenticity and naturalness, such as locally created or organic foods. The food is costing more because of higher production costs and exclusive features. The exclusivity comes from the higher quality and the little availability. The steep prices make this only available for a small amount of people.

10. Low cost food.

Low cost food will also increase in quality since there is a healthy trend going on. But this will have an impact on the kitchen since there is less of a need to make your own food since low cost food could also mean healthy.

Due to the economic situation in many countries and parts of society, there is a growing demand for low cost food. (reference 40) This makes the food available for a big market, and guarantee accessibility. On the other hand, and in contrast to health, these products could come with a loss of quality.

Fastfood could also become healthier.
(fast food) Food to go trends: (more food to go, more options, healthier)
If this is not in the other article, add.
http://www.ife.co.uk/news/ife-2017-blog/food-to-go-developments-and-trends

11. Speed and fast food.

As we have less time to spend on other things than our career, we want food fast. Fast food can grow to replace the kitchen for some people.

Our lives have become fast-paced and hectic and so have our eating habits. For years people are living lives where less and less time is available to them and their families. And also reduced the time dedicated to cooking and meals.

In fact, as Niola affirms, "if in the past every grandmother was a living cookbook, ready to give lessons and pass on the secret alchemies of family dishes, now those precious flying pages have been scattered by the winds of modernization. As a result, eating at home gets worse and worse, and is always more hurried. And most people consider cooking a waste of time." (REFERENCE 45) This leads to an increase in the trend of eating at odd hours, on the road, or during the commute from home to work. Food has become increasingly more "mobile," while the custom of eating three meals a day is being progressively replaced by the frequent intake of quick snacks. For example, many people regularly eat at bars and coffee shops where sandwiches and fast food can be found. In addition, there are studies which report how, in the United States, 15% of meals are eaten in cars and , as a confirmation of this trend, about 60% of sales of fast food breakfasts are made at the "drive-through window." (REFERENCE 46) Secondly, it points out how the types of products purchased also tend to undergo changes as more attention is paid to foods with a high service content, that are easy to purchase and prepare and convenient and quick to eat. These convenience foods, ready-to-eat or semi ready foods, to be cooked in a microwave or just heated up, are a manifestation of the technological innovations that have occurred in the food industry. Furthermore, there is also a growing demand to optimize the time needed to prepare meals. In this sense, the success achieved in the United States by the Dream Dinners chain is significant. It offers an alternative method of meal preparation: it is a chain of "do-it-yourself dinner shop" stores, where people can quickly prepare meals that are more functional relative to individual needs while being less expensive than ready-to-eat foods purchased at supermarkets or from restaurants. Such as Eatsa: http://www.iftf.org/future-now/article-detail/eatsa-the-future-of-food-automation/ Customers first select menus and order the ingredients they need online, then make an appointment at the closest store to assemble the ingredients, and prepare a minimum number of dinners to take home. (REFERENCE 47) Two types of impacts on human behavior can be linked to the aspects discussed up to this point. The first is the search for ever-greater convenience in eating, which translates into the trend of purchasing convenience foods. The second type refers to the spread of a constant state of psychological pressure among people, which often involves high levels of frenzy, impatience, and emotional stress. All this leads not only to a reduction in the time dedicated to meals, but also to a generally poor level of attention paid to a diet's nutritional aspects. https://www.barillacfn.com/m/publications/eating-2030.pdf

Busier lifestyle and less quality time. http://www.economist.com/news/christmas-specials/21636612-time-poverty-problem-partly-perception-and-partly-distribution-why

Faster cooking services:
Other platforms are about making cooking easier, such as hello fresh. Taking out the burden of thinking of recipes, but getting your box delivered with a recipe so you only have to cook.
Hello fresh.
Albert heijn recipe bags.

12. Food replacement.

Food can also become about pleasure, certain meals can be replaced by a shot of vitamins and nutrients. Soylent is a good example of how people could have breakfast, lunch or dinner when they do not want to but need to eat. The kitchen would practically be irrelevant for people if they just only eat outdoors.

Another form of fastfood, but which is actually and arguably healthy are functional foods like Soylent. It are drinks made from powder with all the nutrients that your body needs a day. The head of the company is only drinking this for over a year and completely believes in this product. Fastfoods like this could become a standard to quickly get the energy your body needs, without actually bothering to have to eat.
Reference: https://www.soylent.com/

13. Individualism / Personalisation.

This trend however make room for great personalization of food. Food can be personalized to the person since it is only one person eating it. Food can be created that is so specific it fits the personal needs of a person's diet, genetic heritage, diseases.

A trend that is growing is that we are becoming more individual, therefore food is also increasingly being eaten individually and in the shortest time possible. The cause for this can be presumed to be because of the general acceleration of the pace of life.
Eating has gradually lost its purpose of socialization, interaction and the preparation of the meals themselves. The decrease in home-style cooking corresponds with the

decrease of family bonds and habits, which were always closely related and integrated with the preparation and eating of meals. (REFERENCE 48).

Eating alone for example care less about preparing and eating meals, with a higher preference for consumption of snacks (reference 49). This all leads to the decrease of time to actually eat food.

Personal food. http://www.morethanmayo.com/foodtrends-2017/

The new generation is totally accustomed to personalization. Big data is not a science fiction term, but a fact of life and it is very common that online only information that is relevant to you is offered. Their whole life is about ... well, themselves. They are encouraged and applauded as a child and choose very consciously for what they want to do in life. They adapt their environment and circumstances to their life and career, not vice versa. And they adjust their food to themselves. They eat what's good for them. They are what they eat, and with what they eat they show who they are. Also, they eat at the time that suits them best. Fixed meal times are fading and breakfast dishes also work fine as dinner and the other way around. We are increasingly opting for what nourishes us personally. Actual personalized food is coming. Research is being done on how we can further develop our existing diet into something that is better for our bodies. Like fertilizing and improving crops or adjusting food on the nanoscale. Ultimately, we'll be able to cook our meals or 3D print them according to our own nutritional needs and our DNA.

Food experience. http://www.morethanmayo.com/foodtrends-2017/

Food is going beyond the taste of it into the experience of it. Generation Y is about experiencing life and experiencing food in new ways is part of that life.

Generation Y shares instead of possesses. They attach more value to 'experiences' than 'things'. They seek new experiences consciously and they have seen more than all previous generations. And they are used to it. The market already developed from product-oriented to a service-oriented. From there we went to a marketing orientation and now we are moving into a concept-oriented market. For generation Y is everything before concepting lies far, far behind them. They don't feel the need to satisfy functional and material needs, they seek deepening, experience and self-development. Taste, discover and be a part of it. Only brands or organizations they share an ideology with, they have a connection with at a value level and they feel involved with, will be embraced. It's not about the product, it's about perception and experience. Meaningful experience. Sharing heartfelt stories and values. Inspiring visions to identify with. Creating an emotional connection. With attention to every detail and how they merge into an authentic and meaningful concept. Everything has to be right, online and offline. 'The purpose of life is to experience it to the utmost'.

14. Eating experiences:

As food gets better, bars and restaurant will need to go beyond taste and focus on the overall experience. Some restaurants in Asia already use robots as staff to save on wages and be part of the experience. San Fransisco restaurant chain Momentum uses a robot that makes 360 burgers per hour.

http://www.businessinsider.com/chinese-restaurant-robot-waiters-2016-7/?international=true&r=US&IR=T/#such-tracks-can-support-

more-than-just-robots--this-bot-in-yinan-brings-in-dishes-on-the-back-of-a-bike-11
http://momentummachines.com/

15. Sustainability and transparency.

The kitchen is a big source of waste in people's houses, which is caused by all the wasted food and packages. It is not a very sustainable environment. Additionally, products people buy will become more transparent to also be more sustainable overall.

As mentioned about the more critical consumer, he or she will also be more critical about sustainability. This will require companies to become more transparent in their food. Being able to open up into what ingredients they use (traceability) and what their impact is, not only on the environment but people's health as well. The food industry will be required to take greater responsibility to stay competitive in this future setting. Food waste is another major problem because nothing is done with it, but it only costs money and is bad for the environment. Business opportunities lie in reusing this waste, by for example allocating it to people who might use it.

http://futurefood.network/the-future-of-food-ten-trends-in-food-sustainability/

LeftoverSwap for example is designed to minimize food waste,

References:
1. 9. European Commission, European Research Area Food, Agriculture & Fisheries & Biotechnology Food. Since there is not a legal definition of the concept at either the European or national level, the definition for functional food goes back to 1999 and is the product of the work of a commission

of 100 European experts in nutrition and medicine, who worked for three years on the FUFOSE (Functional Food Science in Europe) project. In the same manner, there is nounanimous judgment as to their usefulness and practicality. As an institution that protects consumers, the European Food Safety Authority (EFSA) has the responsibility of evaluating thescientific reliability of new requests for authorization for functional indications on health and forindications regarding reduction of risk of disease.

2. 12. Cultura Gastronomica Italiana [Italian Gastronomic Culture] (2007), I Musei del Gusto. Mappa della memoria enogastronomica [The Museums of Taste. Map of the Enogastronomic Memory], Carsa Edizioni, Pescara.

3. 15. "Hedgehog Review," V, 3, 2003.

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5. 21. Italian Ministry of Health, Relazione sullo Stato Sanitario del Paese 2009-2010 [Report on the Health Status of the Country 2009-2010].

6. 22. Esposti, R. (2005), Cibo e tecnologia: scenari di produzione e consumo alimentare tra tradizione, convenzione e funzione [Food and Technology: Production and Food Consumption Scenarios Among Tradition, Convention and Function], Agriregionieuropa, Ancona.

7. 25. Barba, B. (2008), Tutto è relativo. La prospettiva in antropologia [Everything is Relative. Perspective in Anthropology]. SEID, Florence.

8. 26. Speech by Prof. Massimo Montanari during the BCFN Scientific Symposium, March 5, 2012.

9. 36. Montanari, M. (2004), Il cibo come cultura, Laterza, Rome-Bari.

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11. 38. Niola, M. (2012), Non tutto fa brodo, il Mulino, Bologna.

12. 40. BCFN (2011), Il costo del cibo e la volatilità dei mercati agricoli: le variabili coinvolte [The Cost of Food and Volatility of Agricultural Markets: The Variables Involved].

13. 45. Niola, M. (2012), Non tutto fa brodo, il Mulino, Bologna.

14. 46. Watson, R. (2012), Future Files, Nicholas Brealey Publishing, London-Boston.

15. 47. www.dreamdinners.com.

16. 48. Niola, M. (2012), Non tutto fa brodo, il Mulino, Bologna.

17. 49. Osservatorio FedeSalus (Italian Federation for companies that produce health products).

FUTURE SCENARIOS FROM FOOD TRENDS

The following list is a collection of trends that are expected to emerge in the future. Some are contradictory, but as many things in the world, these coexist. Creating this overview of future trends helps in developing a correct vision of the future. This overview is made through the analysis of different technological trends, social trends, and societal developments. These trends are important to understand what could be potential influencing effects on the kitchen environment. This page gives an overview of the different trends related to food and therefore also the kitchen environment. In the conclusion we analyze what factors are important to take into account with respect to the target group. For the full explanation on these trends please look at appendix 3.

1. Taste, Flavor and satisfaction:

"Satisfaction is about eating together. Social factor of food gains importance"
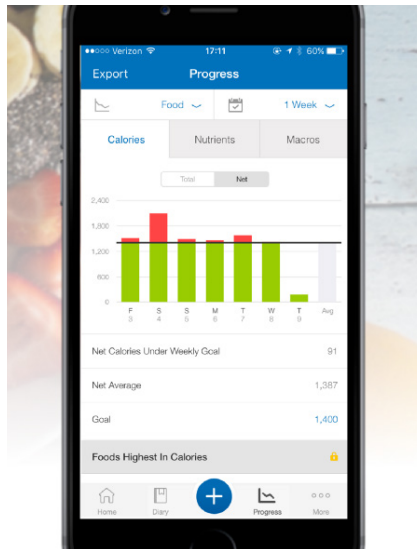
2. Caring for health.

"Health is more important than ever, people will increasingly track what they eat, need to eat, and how to prepare it."

3. Traditional cooking.

"Though new innovations will emerge, traditional way of cooking will also remain as a counter movement."

4. Food alternatives

"Because of new regulations and better transportation possibilities, more foods will go global. Insects could become our diet in the future."

5. Food production technology.

"As the consumers gets more critical, food production will get better too. More and better food will emerge, healthier and lab grown foods."

6. Naturalness.

"The least amount of handling and the least amount of technology could also become important for having a natural diet."

7. Globalization of flavors.

"The growing mobility results in a increase in the culinary landscape over the world, influencing what you take into the kitchen."

8. Local and regional food.

"Foods can grow locally and be distributed more efficiently than ever. This will allow people to eat what grows near to them."

9. Luxury food.

"As new foods emerge, so will luxury food also grow in authenticity, naturalness, taste."

10. Low cost food.

"Low cost food will also increase in quality because of competition and the health trend. This could mean less people will cook and use fast-food as a healthy fast alternative."

11. Speed and fast food.

"As we have less time to spend on other things than our career, we want food fast. Fast food can grow to replace the kitchen for some people."

12. Food replacement.

"Food can also become about pleasure, certain meals can be replaced by a shot of vitamins and nutrients. Soilent is a good example of how people could have breakfast, lunch or dinner when they do not want to but need to eat."

13. Individualism / Personalization.

"Food can be personalized to the individual person since it is only one person eating it. Food can be created that is so specific it fits the personal needs of a person's diet, genetic heritage, prevention of diseases or simply pleasure."

14. Food experience.

"Food is going beyond the taste of it into the experience of it. Generation Y is about experiencing life and experiencing food in new ways is part of that life."

15. Sustainable & transparent.

"The kitchen is a big source of waste in people's houses, which is caused by all the wasted food and packages. It is not a sustainable environment. Additionally, products people buy will become more transparent to also be more sustainable overall."

Innovative

Healthy

Effort of the user
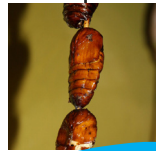
Traditional

FUTURE SCENARIOS

The food trends on their own are interesting, but become more interesting when implemented to the kitchen context. To understand what the future scenario's of the kitchen could entail, the following scenario's were made. The purpose of these scenario's was to guide the designer towards a future that would fit certain trends. It is important to take these developments into account in order to design something for the future, how do they affect the kitchen? This resulted in four different future scenario's for the future kitchen.

1 The automatic kitchen | Trends: 5, 9, 14.
Scenario where people do eat in their kitchen but food is prepared automatically. This way it is fresh but does not require any attention from the user. Oven meals, and 3d printed meals will be instantly created by the kitchen, even cutting is done in the kitchen to make fresh food. However the user has no trouble to prepare the food.

2 No kitchen | Trends: 10, 11, 12.
Scenario where people do not have any time and do not care for the process of eating since they trust the process of food to be done by others. Food is ordered in and contained, all consumers have to do is heat it properly to eat. Or since there is more healthy food available to be ordered in, they do not feel the need to have a place to cook. When they need something they also buy healthy food on the go.

3 Green kitchen | Trends: 2, 4, 6, 8, 15.

The kitchen is an environment where things are grown and developed at home or close to home. Users prepare the food themselves and want to keep their nutrition as healthy and natural as possible. Though there are many alternatives, these consumers do not want others and do not trust others to prepare their food. They need to stay in control and want to have the most healthy locally grown foods at home. These are grown at home or kept at home to keep it natural as possible. They also grow their own meat.

4 Helpful assisting kitchen | Trends: 1, 3, 7, 13.

They also like to stay in control of their food preparation without giving it away to machines. The kitchen serves as an assistant to create the food users want to make in this environment. The kitchen automatically starts heating up the oven or extra cool your fridge when you come home. When you are there it helps you by showing you controls over your kitchen appliances to make the perfect steak on the perfect temperature. When you get called and walk away, it automatically lowers the heat and waits for you to come back.

Fit with ATAG:

Though there are multiple possible scenario's, the best fit to ATAG is that of scenario 4. ATAG is about the love for cooking, and the future of IoT and ATAG should be about supporting cooking, without taking control over the process. This scenario does not eliminate another, an IoT scenario might as well allow for the first scenario, an automatic kitchen and an assisting one. To get a good understanding of what kind of future the design will have to be in, a scenario was made of how this future would look like.

IOT COMPARISON

Products:	How it does it:
Preparing food:	
1. Moley robot arms	Cooks for the user with 2000 programmed meals.
2. Foodini food printer	Prints food with different ingredients.
3. Smart oven Maid/June	Programmed functions, instructions, extra control
4. Cinder automatic Grill	Automatically bakes meat, connects to phone.
5. Mellow	Sous vide cooking connected with app
6. Crock pot slow cooker	Slow cooking of food, connected with app
7. Pantelligent	Track temperature and gives instructions through the app
8. Oliver	Automatically cooks food through the different compartments.
9. Hestan Cue	Measures weight, gives instructions on the app, temperature control
10. Smartypans	Measures weight and gives instructions on the app,
11. Joule	heat the pan through the element, connect with the app.
Track Temperature:	
12. Paragon	Helps cooking through temperature sensor connected with app
13. Meater	Track temperature and gives instructions through the app
14. Range	Track temperature and gives instructions through the app
Farm insects at home:	
15. Hive	Grows larves in containers
Recycling kitchen waste:	
16. Zera home recycler	Changes waste to compost
Cooling & inventory:	
17. Smarter fridge Cam	Wifi enables camera
18. Smart fridge Samsung	Media screen and camera to check contents.
19. Smart Fridge LG	Tracks temperature and ice
Measuring / tracking food:	
20. Smart scale SITU	Tracks nutrients and calories
Growing herbs:	
21. Clickandgrow	Provides water and light
Hands free interaction:	
22. Alexa	Uses voice commands to search google.

Value it brings:	Value:	Frequency:
better food, automation, time, certainty.	certainty	16
food consistency, new possibilities	guidance	13
time, control, precision, guidance, certainty.	precision	11
time, quality, precision, temperature, monitoring, control, guidance, certainty.	control	9
quality, precision, temperature monitoring, control, guidance, certainty.	monitoring	8
quality, precision, temperature monitoring, control, certainty.	temperature	8
quality, precision, temperature monitoring, control, guidance, certainty.	quality	5
automation, time, consistency, guidance, certainty.	time	4
precision, guidance, certainty.	automation	3
precision, guidance, certainty.	inventory	2
quality, precision, temperature monitoring, control, guidance, certainty	consistency	2
	overview	2
	food	2
temperature monitoring, precision, control, guidance, certainty.	information	2
temperature monitoring, precision, control, guidance, certainty.	others	1
~~temperature monitoring, precision, control, guidance, certainty.~~		

meat replacement, guidance.

green behavior, money, space, compost.

inventory overview, certainty.
inventory overview, certainty.
information

information

automation of growing, certainty.

get recipes, guidance, help during cooking. no hands needed.

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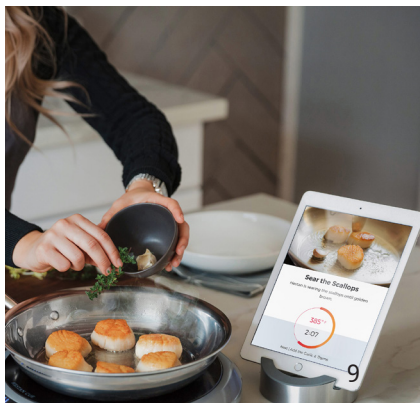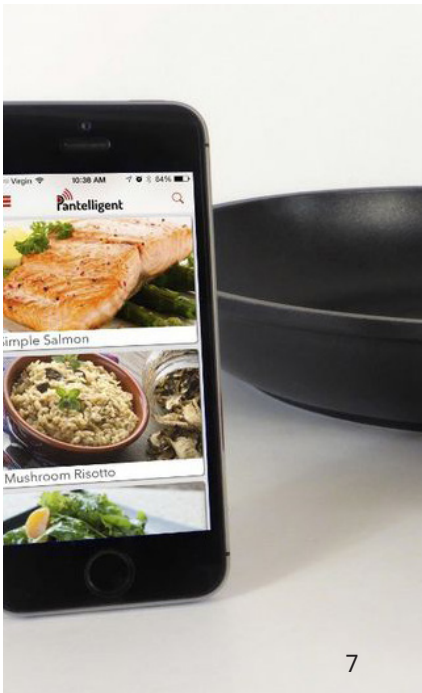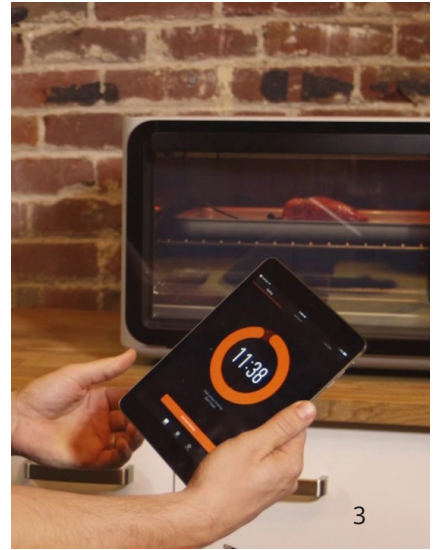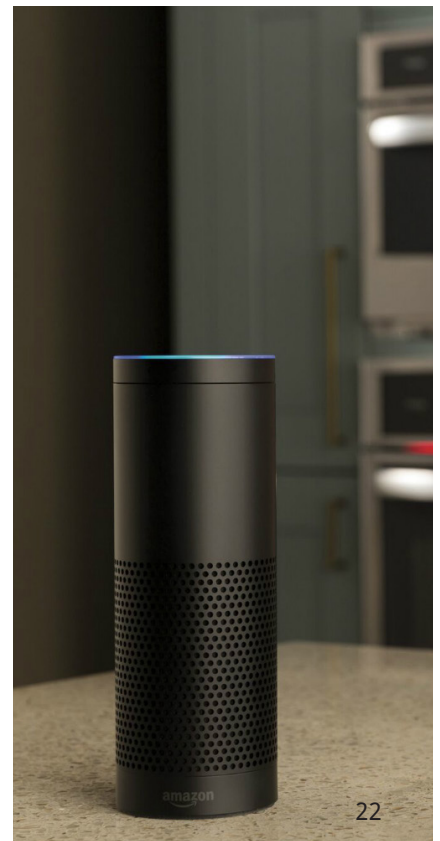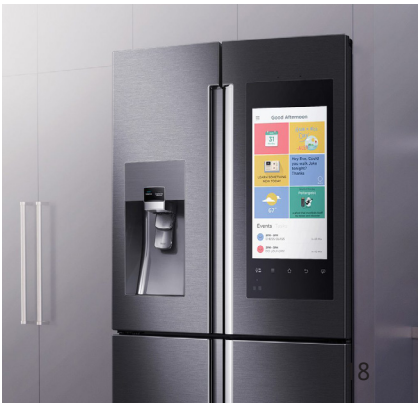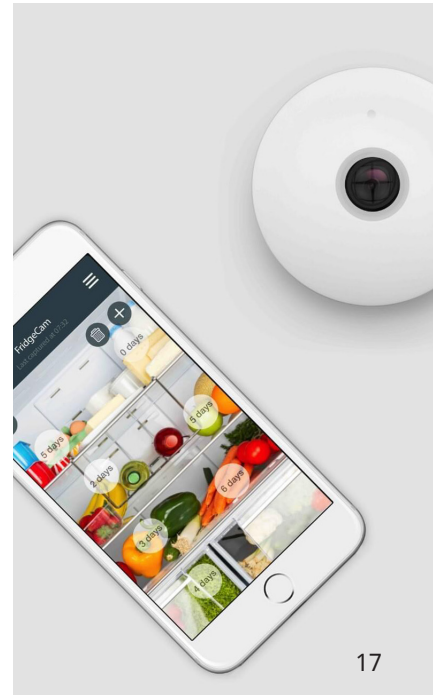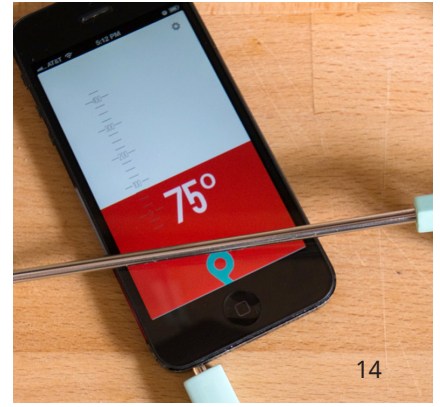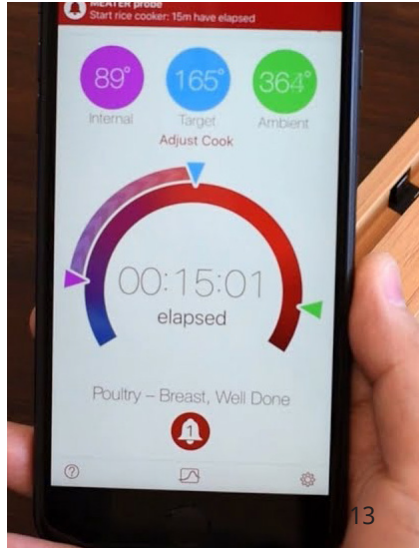
STORE QUESTIONNAIRE

Locatie: _____

Male / Female
Age: ___ - ___
Family: (married, children)
_____
Job / education
_____
Why do they choose ATAG?
_____
_____
_____
What do they buy the most from ATAG?
_____
_____
Are there things they specifically do not buy from ATAG? Why?
_____
_____
How much do they love cooking?
_____
_____
How good are these people in cooking? (scale 1-5)
Bad/Reasonable/Normal/Good/Professional,Because:_____ _____
_____
How technical are theses people? (scale 1-5)
_____
_____
How much time do they have for cooking? how much time to they reserve?
_____
_____
What other brands do they buy kitchen appliances from?
_____
_____
What other brands would you associate with these people? (NOT USED)
_____
_____
What do these people find important in the kitchen? / What are their greatest needs?
_____
_____
_____
What are their biggest kitchen frustrations?
_____
_____

STORE QUESTIONNAIRE RESULTS

100% Couples.
Age: 35-60, 40+, 25-70, 35+, 25-50.
Married with children.
HBO-level or higher and wealthy.
They choose atag because they know it by name, it is a brand that is reliable, dutch and has history. This fits with the high demands of the consumers buying the products, who are looking for quality, easy of use, exclusivity and reliability.
People mostly buy cooking tops from ATAG.
Products that are better priced from other brands, such as fridges with equal functionality but for half the price.
Customers buying ATAG products are either fanatical hobbyists or professionals.
Customers are on average good cooks. (3,5 / 5)
On a technical levels they score average. (3 / 5)
They spend more time in the kitchen than others, but the younger they get they tend to talk more about being able to spend less time.
Other brands they buy products from and are competitors are Siemens, Miele, AEG or Novi. All because they are within the same price range, and offer similar products and specifications.
-
Easy of use and quality is important in the kitchen, most of all the durability of products. But in the end, people want to have a matching nice looking set.
Cleaning, failure in cooking, products that break easily or that do not function properly.

Conclusion:
On average, atag consumers are people who love to cook. They spend a normal to a longer period of time in the kitchen and would therefore like to invest. Because they are very interested in cooking, they tend to be the better cooks. But because the pricing is quite high, they tend to be a little older than average (30+). Relationship wise and family wise they have children and are married. Their biggest frustration from the kitchen is cleaning, and failure in the kitchen. The biggest problem they experienced in the kitchen are appliances that break down, by buying atag products they expect to buy quality and durability, real dutch design.

PERSONA'S

1 "THE PROFESSIONAL FAMILY"

"WE KNOW BETTER TO HANDLE FOOD THAN SMART DEVICES CAN."

Names: David & Emilie
Age: 35 & 29
Family: Married.
Job: Chef in a 5 star restaurant. / project manager at an architecture firm.
Income: € 3000 & € 2800
Cooking level: o-o-o-o-x| o-o-x-o-o
Technical level: o-x-o-o-o | o-o-x-o-o
Hobbies: Watch cooking shows, go to restaurants, tastings, friends, family.
Values: Authenticity, quality, durability, transparency.
Story:
David is a professional chef and wants the same quality of work at home. But is relatively conservative with his way of cooking. They only wants new functions if it gives him extra control. His wife loves to help him as well with the process, she admires him for his ability to cook such nice meals. They chose atag products because they are looking for the same quality as David is used to at his 5 star restaurant. Also since Emelie was able to get hold of their fancy Amsterdam apartment, they needed equipment that also looked equal in style.
David embraces new technologies in the kitchen and new foods possible to make because of technology. But as a oldschool taught chef, he still want to be in control over his process, and therefore is able to do more than the products people buy to be cooked for.

2 "TECH-SAVVY FAMILY"

"I LIKE IT WHEN SOMETIMES, MY DEVICES HELP ME WHILE COOKING.""

Names: Sanne & Bram
Age: 29 & 31
Family: Married.
Job: Consultant & Programmer
Income: € 2750 / € 3500/ month
Cooking level: o-o-x-o-o
Technical level: o-o-o-o-x
Hobbies: Tinkering, electronics, building applications, reading yoga.
Values: Simplicity, Quality time, automation, calm.
Story:
A wants to make his home as intelligent as possible. He has bought all kinds of intelligent devices for his home. From easy ordering to intelligent cooking devices, he can basically have half of the work done by the time he is home.
He likes to cook, but does not mind of some tasks are taken over. Some things are just required a human touch, and he also liked to cook with his girlfriend. Together they choose to focus on one new thing they want to learn, and let the machines take over other processes that would otherwise distract them.

3 "THE HOBBYIST FAMILY"

"WE LIKE IT THAT WITH THE NEW DEVICES, WE HAVE A MUCH BETTER OVERVIEW TO PREVENT US FROM MAKING MISTAKES""

Name: Lisa & Maarten
Age: 25 & 26
Family: Married.
Job: Dietitian & Lawyer
Income: €2000/ month €3000/ month
Cooking level: o-o-o-o-x | o-o-x-o-o
Technical level: o-x-o-o-o | o-o-x-o-o
Hobbies: Running, Musea, Cooking, Tastings.
Values: Naturalness, healthy, down-to-earth, knowledge, precision.
Story:
Cooking with her girlfriend all the time. The kitchen is the center of the house and the center of their relationship. Learning a lot in the kitchen, but still make many mistakes, would like to have some more focus on one task, and like to be communicated clearly what they do right and wrong. So their kitchen is used in such a way that all devices give the best feedback to them in what the status of the food is. They don't act, but they allow them to get a better overview and also control the food more precisely.

4 "THE SOCIAL COOK FAMILY"
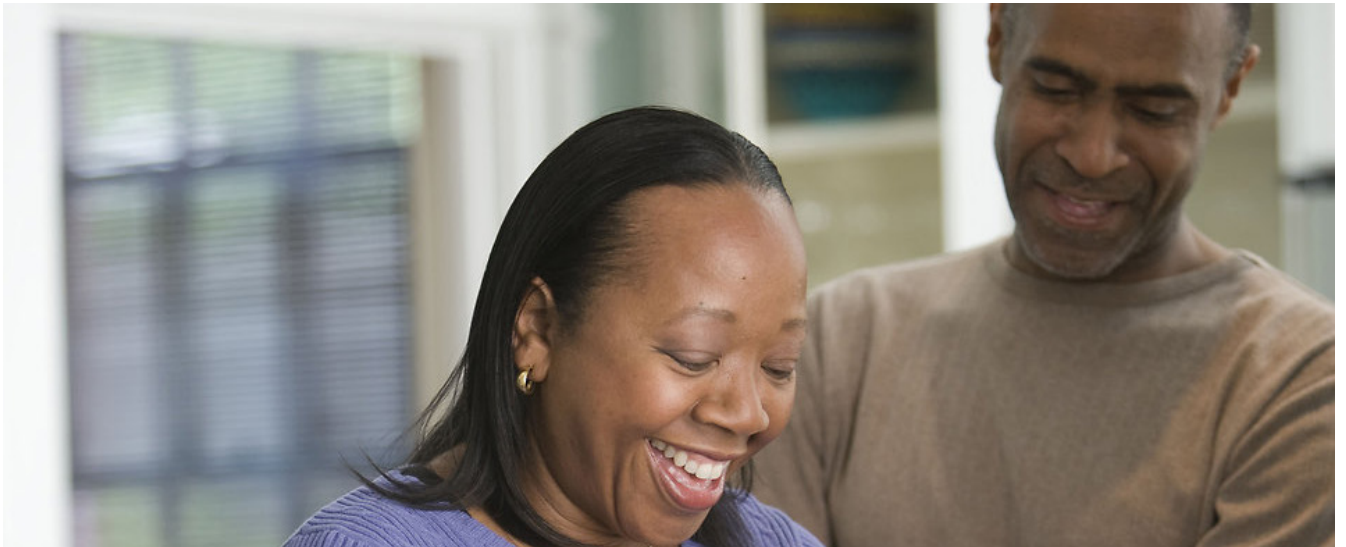
"SINCE WE COOK TOGETHER WE ALSO GET DISTRACTED A LOT, OUR NEW KITCHEN REALLY HELP US KEEP CONTROL WHILE TALKING!"

Name: Tamara & Gregory
Age: 42 - 49
Family: Married - Children - Grandchildren
Job: Musician, banker.
Income: €2000/ €2800 month
Cooking level: o-o-x-o-o | o-o-x-o-o
Technical level: o-x-o-o-o | o-o-xo-o
Hobbies: Gardening, reading, baking, making music.
Values: Togetherness, social, family.
Story:
Cooks, but sees cooking more as a way to reconnect. Talking is more important than cooking. They love the new line of atag products which they bought for their new kitchen. Since both of them enjoy a glass of wine and cannot stop talking to one another, it so happens that a lot of dishes just go wrong a little every now and then. That is why they chose for ATAG, these new products help them so much that they are able to enjoy eachothers company and are not distracted by the food they are making.

WORKBOOK

Dag 1 voorbeeld

Om het makkelijk te maken, kunt u hier altijd even het voorbeeld bekijken.

😊 *Positief*

15:15
recept bedacht ;)

avondeten, samen 19:10

18:15
snijden

koken

18:40

afruimen

🍴 *Tijdlijn*

15:00

Winkelen
17:30

18:00

19:20

Groente en vlees al klaar,
aardappels in de oven moeten nog langer :(

☹ *Negatief*

supermarkt had niet alles,
moest recept wijzigen.

🕐 *Tijd*

	Recept bedenken		Boodschappen		Koken		Eten		Afruimen	
		30m		30m		25m		30m		10m

👤 *Mensen*

1	1	1	3	1

Grootste plus Iedereen at mee en genoot van het eten, ook had ik iets nieuws geprobeerd te maken.

Grootste min Recept had ik niet goed gelezen, hierdoor kwam mijn timing niet goed uit.

Dag 1

Naam

😊 *Positief*

🍴 *Tijdlijn*

☹ *Negatief*

🕐 *Tijd* | Recept bedenken | Boodschappen | Koken | Eten | Afruimen |
|---|---|---|---|---|

👤 *Mensen*

Grootste plus

Grootste min

CONSENT FORM

Toestemmingsverklaring

Onderzoek: Kookliefhebbers en technologie.

Uitvoerende onderzoekers: J.L. Koghee   jorickoghee@unitid.nl
Projectcoach: Dr.ir. Stella Boess   S.U.Boess@tudelft.nl
In opdracht van: TU Delft
Locatie: ....

In te vullen door de deelnemer
Ik begrijp en heb geen bezwaar dat dit onderzoek met beeld en geluid zal worden vastgelegd. Ik ga akkoord dat alle resultaten van het onderzoek vertrouwelijk zullen worden behandeld en anoniem zullen worden verwerkt in het verslag. De resultaten zullen alleen worden gebruikt voor het afstudeerproject van Joric Koghee.

Ik stem geheel vrijwillig in met deelname aan dit onderzoek en erken een kopie van deze toestemmingsverklaring te hebben gekregen.

Naam deelnemer: Handtekening deelnemer:

....

Datum: ....

In te vullen door de uitvoerende onderzoeker
Ik heb een mondelinge en schriftelijke toelichting gegeven op het onderzoek. Ik zal resterende vragen over het onderzoek naar vermogen beantwoorden.

Naam onderzoeker: Handtekening onderzoeker:

....

Datum: ....

INTERVIEW QUESTIONS

Mijn afstudeerproject gaat over het ontwerpen van een keuken van de toekomst. Om dit te kunnen is het belangrijk om te observeren bij mensen in de keuken. Mijn doelgroep zijn mensen die van koken houden waar jij dus ook onder valt. Daarnaast ben je ook geselecteerd aan de hand van andere criteria van het online formulier. Tijdens dit interview ga je wat koken in je keuken. Hier zal ik je vragen stellen terwijl je dit doet. Dit heet een contextueel of etnografisch interview. De vragen die ik zal stellen zullen veel in de richting zijn van waarom je dingen doet, en soms misschien wat irritant of kinderachtig klinken, maar het is voor het onderzoek erg belangrijk om door te vragen. Laat dit je niet weerhouden maar begrijp dat ik op zoveel mogelijk vragen antwoord probeer te krijgen. Elk antwoord is goed, zolang je het maar naar eigen waarheid beantwoord.

Introductie:
* Wat voor werk doe je?
* Wat zijn je hobbys?
* **Wat ga je nu koken?**
* Waarom heb je voor dit gekozen?

Hoofdvragen:
* Wat kook je graag voor jezelf?
* Waarom kook je dat graag voor jezelf?
* Wat kook je graag voor meerdere mensen?
* Waarom kook je dat graag voor meerdere mensen?

Voorbereiding:
* **Ik pak even je kooktijdlijn erbij, kun je me meenemen met het proces, wanneer weet je wat je gaat maken? Wanneer haal je de boodschappen, etc? (doornemen boekje)**
* **Hoe beslis je wat je gaat maken? / Waar haal je je inspiratie vandaag?**
* Wanneer beslis je wat je gaat maken?
* Hoe houd je rekening met de mensen die mee eten, hoeveel tijd je hebt, waar je boodschappen doet, etcetera? ⍰
* **Hoe plan je met wie je kookt, en wanneer je kookt? ⍰**
* **   Waar spendeer je graag je tijd aan tijdens de voorbereiding?**
* Waar heb je moeite mee met de voorbereiding?
* Waarom is dit lastig?
* **Waar zou je liever je tijd niet aan besteden? ⍰**
* **Waar spendeer je graag je tijd aan tijdens het koken?**
* **Waar zou je liever je tijd niet aan besteden? ⍰**
* 　　　　　Waarom is dit niet je tijd waard?
* **Waar zou je graag extra tijd aan besteden?**

Liefde voor koken
* **Waar hou je van om te koken?**
* Waarom hou je ervan om dat te koken?
* Wat maakte je blij de vorige keer dat je aan het koken was?
* **Waar focus je je op met koken?**
* **Waar ben je goed in met koken?**

- **Wat doe je graag met koken? / Wat nog meer?**
- **Waarom hou je zelf zoveel van koken?**
- **Wat betekent koken voor jou?**
- Wat vind je belangrijk aan het process van koken?
- **Wat zijn je trucjes?**
- Wat zou je nog meer willen kunnen in de keuken? Gebruik de objecten. ☐
- **Wat is bijzonder aan jouw manier van koken?**
- **Wat kan je nog niet en zou je nog graag willen leren?**
- Waarom kan je dit nog niet? ☐
-      Hoe zou je dit doen met behulp een van de drie objecten?☐
- **Wat zou je juist anders willen doen? ☐**
- Waarom? En waar ligt het aan dat je het nu nog niet doet?
-      Hoe zou je dit oplossen met een van de drie objecten?☐
- Wat zou je niet anders willen doen dan hoe je het nu doet?
- Waarom?
- **Ik zie dat je vooral blij bent tijdens …. en ……. , waarom vooral op deze momenten?**
- **Waarom zijn deze momenten zo belangrijk? (boekje)**

Minpunten van koken
- **Ik zie dat je vooral het minst blij bent tijdens …. en …. , waarom vooral op deze momenten?**
- **Waarom zijn deze momenten zo negatief vergeleken de rest? (boekje)**
- **Wanneer heb je soms geen zin om te koken?**
- **Waarom heb je er dan geen zin in?**
- Wat gebeurde de laatste keer dat je niet genoot van het koken?
- **Waar irriteer je of stoor je je aan tijdens het koken?**
- Waarom irriteer je je dan?
- **Wat gaat er wel eens fout tijdens het koken?**
- Waardoor komt dit?
-      Hoe zou je dit oplossen met een van de drie objecten?☐
- Wat is je grootste irritatie tijdens het bereiden van een maaltijd? ☐
- Waarom? Wat zijn andere irritaties?
- Vergeet je wel eens iets als je gaat koken?
- Als je het vergeet, hoe los je het probleem op?
- **Wanneer mis je informatie tijdens het voorbereiden of koken? ☐**
- Wat mis je dan en hoe heeft dit invloed op je kookproces?
- **Wat zijn volgens jou de grootste minpunten van koken?**

Uitdagingen / vernieuwing
- **Wat heb je voor het laatst nieuw geleerd met koken?**
- **Waar heb je dit gevonden? Hoe ben je hier op gekomen?**
- Wat zijn dingen gerelateerd aan koken die je nog zou willen leren?
- Waarom?
- **Wat is voor jou een grote uitdaging om een maaltijd op tafel te zetten?**
- Waarom is dit lastig?
- **Wat is je grootste uitdaging tijdens de voorbereiding?**
- Waarom is dit zo lastig? Wat is nog meer een uitdaging?
- **Wat is je grootste uitdaging tijdens het koken?**
- Waarom is dit zo lastig? Wat is nog meer een uitdaging?
- Wat heb je geleerd en achterwege gelaten? / waarom?
- **Als iets niet lukt en je loopt vast met koken, hoe los je dit dan op? Als je iets bent vergeten, of iets anders moet?**
- Wanneer en op wat voor manier improviseer je?

Hulp uitbesteding automatisering
- Waar heb je voor het laatst hulp bij gehad met koken?
- **Wat zijn activiteiten tijdens het koken waar je graag hulp bij zou hebben?** ☐ Mis je dan informatie? Zijn dit

handelingen?
- **Waarom wil je hier hulp bij?**
- **Wat heb je voor het laatst om te koken uitbesteed?**
- **Wat zijn activiteiten die je doet voor en tijdens het koken die je liever niet zou willen doen, en graag uit zou willen automatiseren?** ⍰
- **(Bijvoorbeeld, vuur aanpassen als hij merkt dat sommige dingen planning technisch niet goed uit komen.)**
- Waarom?
- **Welke activiteiten absoluut niet?**
- Waarom?
- **Wat zijn dingen die je wel eens vergeet tijdens het maken van een gerecht?** ⍰
- Waardoor vergeet je dit?
- Naast koken, wat doe je nog meer in de keuken?
- Zijn er activiteiten die je ook goed tijdens het koken wat "eigenlijk" niet in de keuken hoort?
- Waarom doe je die dingen?

Technologie en investeringen:
- **Waar heb je in geïnvesteerd in de keuken?**
- Waar zou je graag nog in investeren en waarom?
- **Wat heb je bij andere gezien wat je zelf graag ook zou willen voor je eigen keuken?**
- Waarom?
- Wat zou je graag nog aan willen schaffen voor je keuken?
- Waarom?
- Wat voor technologie gebruik je in de keuken?
- Waarom gebruik je het?
- Wat voor slimme apparaten heeft u in huis, zoals een slimme thermostaat of een fitbit voor je gezondheid?
- Waarom gebruik je deze apparaten? Waarom heb je deze juist niet?
- **Wat voor producten heb je gekocht om mee te koken?**
- **Wat zijn jouw favoriete / meest gebruikte producten in de keuken? (5-10)**
- **Waarom?**
- **Wat zijn jouw minst favoriete / minst gebruikte producten in de keuken? (5-10)**
- **Waarom?**
- **Waar geef je meer geld aan uit dan andere?**
- **Waarom geef je aan het een meer geld uit en het ander minder?**
- **Als alles zou kunnen, echt alles, hoe zou de ideale keuken van de toekomst er voor jou uitzien?**

Black box vragen:
- Als er een magisch product is dat iets voor je zou kunnen doen, hoe zou dit jou helpen met het maken van een maaltijd?
- Waar / hoe zou dit product jou helpen?
- **Wanneer zou je dit product gebruiken?**
- Wat zou het product moeten doen om dit te vervullen?
- **Wat zou het je laten zien?**
- Houdbaarheid, recepten, ingrediënten, mensen die mee eten?
- **Wat zou het voor je doen? Wat zou het voor je regelen?**
- Hoe zou het je handen vrij maken?
- **Wat zou het je laten weten wat je wilt weten?**

OBSERVATIONS

Pilot:

- Cutting a lot.
- Watching outside.
- mostly stays looking into one direction.
- Focused on technique
- Uses hands instead of vergiet
- Does not look at the pan but outside
- Keeps things clean with towel
- rearranges stuff all the time
- check up on dish every now and then.
- does not weigh or measure anything, just throws it all together.
- keeps a plate separate because somebody does not like cheese

Test 1

- A lot of walking back and forth because of the kitchen layout.
- Reinstalls a pit because it was not working.
- Puts on the pan and the fire.
- Cutting neatly, trying to minimize mess
- Uses a measurement cup to know how much she needs for who eats.
- Trouble with the limited space, does not know where to place items.
- Checks regularly, just stirred a little and continues with other things.
- Lowers fire because she thinks it is necessary.

Test 2:

- Cleans everything from the start.

- Neat with everything packaged nice, carefully uses all the ingredients
- Keeps trash together.
- Has a special drawer to put things in the freezer he regularly uses.
- Has a tool for everything.
- Peals out small bones where needed.
- Rotates and moves all over the kitchen.
- Cleans the cutting board.
- makes a bag out of the trash
- Refills the salt.
- Checks a lot if the fish is ready.
- Plays with the food a little.

Test 3:

*Was not cooking and only agreed to an interview, therefore there are no observations. During cooking, only while standing and explaining.

- Using different appliances to set timers than the oven the hood.

Test4:

- Cooking with two persons
- Dividing tasks, cutting vegetables.
- Moving ingredients all over the place, limited space.

- Asking if something is enough, unsure about amounts.
- Uses a small product to cut carrots with into small bits.
- Just puts in a random amount into pans etc.
- Does things such as heating a pan before something goes in because he thinks it's right, no clue if it is better to do it or not to do it.
- Checks up with the dishes regularly to check if things are ready.
- Cleaning stuff while some pans are still cooking.
- Timing is totally off, puts stuff in aluminium foil with the oven potatoes.
- Tastes often to see if something is ready.

Test 5:

- Frequent checking up on food.
- Using apple watch as a timer for everything.
- Cleans and cooks at the same time.
- Tastes when things are ready or not.
- Does a lot of things with his hands.
- Forgets the vegetables, too distracted by the interview.
- Spends extra time making the plate look nice.
- Handles all the ingredients with care.

13. Interview data.

Having control and precision for confidence and guarantee:
"What I like is sous vide cooking, 40 degrees and a piece of salmon and it tastes amazing" - 3
"I love to have that precision of the steam oven, and heating by steam, I use it a lot" -2
"Being more precise in temperature allows you to make your standard dishes in higher quality and also your exceptional dishes in higher quality!" - 4
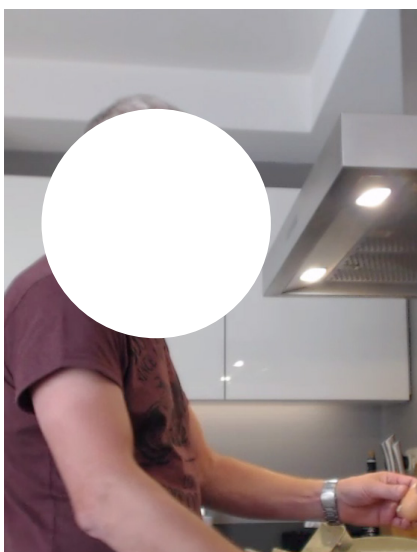
Socially being together is important:
"I like to cook because I am together with my family, everything worked out good and I like to hear that it is nice" - 3
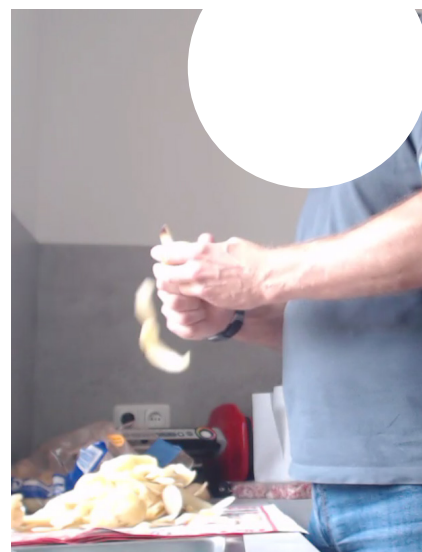
Doing things with your hands (therapy):
"When I cook I use different kind of parts of my brain instead of what I do all day. It is some sort of therapy for me. Therefore I make time for cooking" - 2
"All day I am thinking with my head, what I like about cooking is finally to do things with my hands. There is nothing I do not like about cooking." - 0

Experimenting / improvisation for variation:
"I really like to experiment with new products in the kitchen and see how it changes my cooking" - 3
"You need to keep cooking fun, and you do this by discovering something new"- 0

Smell, looks, process and quality make cooking fun:
"What you see and what you smell is half of what you eat, that makes half of your meal and making your meal makes it more delicious" - 2
"What I find most fun is preparation for cooking, cutting the vegetables, bringing it to taste, smelling it. - 3

Creating something new (for others):
"I like to make stuff that other people do not now if they like yet. I like to broaden people's horizon on food" - 1
"Satisfying feeling is what I get when I make something that worked out good, and the satisfaction is even bigger when it is something new. - 4

**Automating certain tasks is appreciated:**
"What I like are those self cooking pastas devices at Vapiano's that is super! I would love to have that here, but it would take up too much space" - 2

Regularly checking on food feels unnecessary:
"Checking if things are done or not and moving away from my guests is especially annoying" - 2
"I would like it when the standard thing such as cooking pasta, potatoes etcetera require less attention from me. You don't want to be busy with those things." - 3
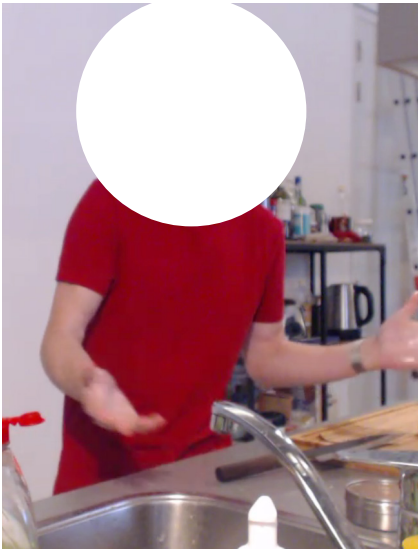
Cooking is very energy consuming:
"If I have the time, more so the energy, time you can always create. But after a long workday, and farther the week gets the less energy I have. I need an outside motivator to really cook. Else it will be more simple." - 5

Automated functions don't give the right result:
"Preset functions are crap, they are not intelligent enough for making it good yet" - 2
"I don't need hand-holding like that" 5
"I set the oven my self, I still do not trust those pre made functions" -3

Tedious tasks:
"Cutting is the least fun part of the process, because it is a lot of work" - 4
"In a perfect world I would like to have everything ready when I want to start cooking. So I don't have to spend time doing that preparation part" - 1

Dislike cleaning:
"I hate cleaning, it is not something I like about the process but is just part of it" - 2
"I hate the mess I make all the time" - 3

Timing is difficult:
"Timing is my biggest challenge to have everything done at the same time" - 1
"To have everything done on time is the biggest challenge" - 3
"I struggle with timing and how much I put into the dish. I do it by feeling. By the time the meat is ready now, the mushrooms are going to be cold. - 4
" Most people cook meat on a high temperature and then timing is much more of a problem." - 5

Temperature control and precision is appreciated for the process:
"Sometimes certain ingredients can cook/bake to fast, or on too high temperature" - 0
"I would be very interested in knowing how warm the center of the food is" - 2
"Cooking is all about temperature, a better idea of that would help" - 4
"I only like to be precise with Sous vide, I think food is very lenient and people try to be too precise. I don't really care for the rest." - 5

Uncertainty with ingredients, actions, amounts:
"You are always wondering what is happening on the inside of this piece of meat? This is always a challenge to know" - 3
"What I find difficult to know is what the influence is of my current action on the end result. What if I turn up the heat or add more water, how exactly would that change the end result? - 0
"What I have trouble with is measuring stuff, I need to weigh off ingredients when I try new dishes"- 2

Difficult to know what the inventory is:
"The biggest problem always for everyone, you don't know what you have at home" - 5
"What I would also like is to have a better overview of my inventory, to know what to buy and when." - 4
"In the future I would like to know what I have, What is in my fridge, how much etcetera. To track what I have. - 2.

Internet is used to assist with challenges:
"I learn new recipes through youtube" - 0
"I would like to get better into making a good piece of meat. In that case I would look at a website and sit with a timer how long it needs to be in there." - 1
"Sometimes we buy ingredients but have no clue how to prepare it, then we search online how to do it. - 4

Managing the cooking process:
"When I have guests over I want to manage everything better. When you make something you want to show your best and leave a good impression. "-1
"I miss information about tasks, working time, do I miss stuff, I repeatedly check stuff because I think something is simple, or I forget an ingredient. Or also amount of ingredients I need to use for recipes." - 2
"When you know the products you have there is not much challenge in timing. But as soon as you try new recipes you feel kind of lost." - 3
Taste is difficult to influence:
"When I try a new recipe, I need to make sure others like it, I can like it but others need to it it too." - 0
" When I am uncertain I check and taste. You do not want to ut but sometimes you have no choice." - 3
" I love to experiment with herbs and taste to see how I can achieve a flavor. I would like to get some advice and guidance on that." - 4
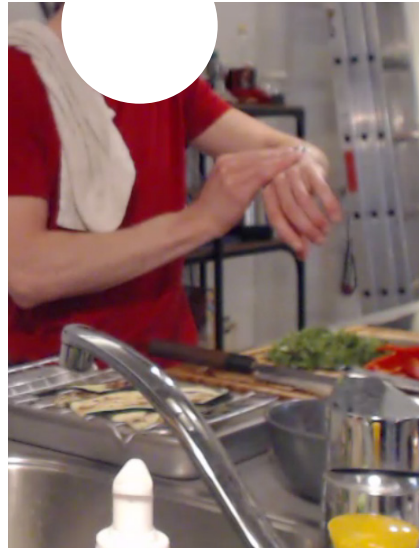
Regular checking & keeping focus:
"I never get distracted when cooking, because I am cooking and if I do something else it is for a really short amount of time" - 0

" I let others work on part of the dish if I have other things to do. So I can trust it to somebody else." - 3

"I regularly check and try and taste and feel if it is how I want it. I am looking and feeling." - 4

Timing is part of the routine:
"You have a certain routine all the time, and you know that if you do this routine it will work out fine." - 0

"Timing is very important, I time everything" - 3

" I always use my apple watch for timers. I also user it for Sous vide because I do not trust the app. I use timers more of a general reminder." - 5

Taste is most important as end result:
"Food has to taste good in the end, it does not have to be nicely cut or anything" - 1

"You taste it and you do not need instructions for that, if it fits your taste it is done." - 5

Online cooking help is used before and during cooking:
"Sometimes I see ingredients at the store, I take it home and then i later see online what i can make with it" - 0
"Sometimes I put my ipad the kitchen to check recipes or methods and techniques on how to do things for this dish" - 1
"We look at food blogs or Youtube, but have an idea for the kind of food and taste I am looking for." - 4.

Learning by doing and improvising:
"When making something, cooking is mostly trial and error, I read the recipe and then I adjust it the next time to my own tasting." - 1
"I never miss information, I just follow my gut feeling" - 4
"I always improvise, it is always new. It is always learning something new" - 5

Recipes are based on inventory or chosen in one go:
"I do groceries 1 time a week, I also decide on the recipes for the whole week" - 1
"I cook with my gut feeling, we buy ingredients one time a week and decide on that day what to cook." - 4
"If i try something new I find a new ingredients and see what goes with that. I add new ingredients that go with it and create a complete dish. - 5

Investing time in cooking is worth it
"I like cooking so if I can make the time I do not mind spending the time cooking." - 1
"Sunday is the day I really cook, because then my whole family is eating with me." - 3
"Sometimes we have an idea and then we buy specific ingredients from different places" - 4
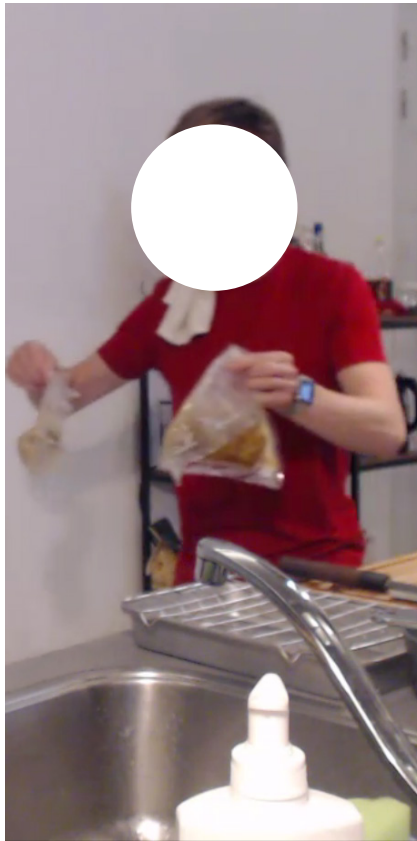
More control:

"For example I look for the best methods that day to prepare the meat, and I set the oven accordingly." - 3

"What also is important for me is that food is healthy and I want to keep control of that." - 4

"Cooking is temperature." - 5

Better quality:

"If things would increase the quality of the food, I would buy it, but not because of speed." - 1

"Preparation can go faster. I have special machines for those tasks, but I do not use them because it is a pain to clean." - 3

"The main reason to buy something new if it would improve the quality of the meals we are preparing and the fun of cooking." - 4
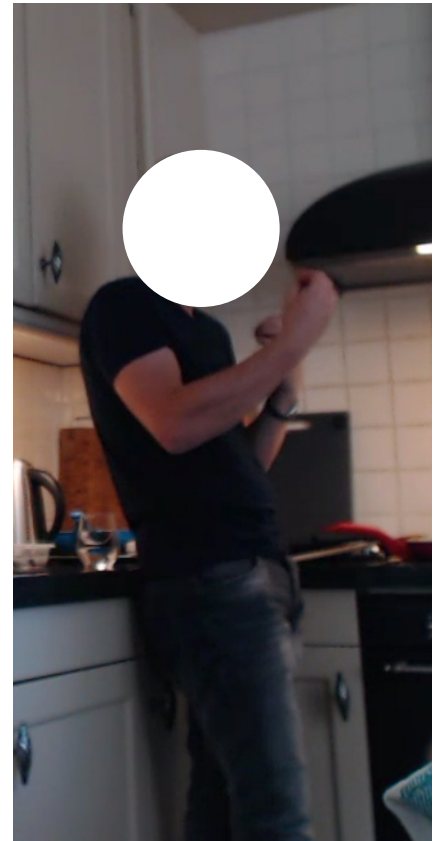
Food is personal and settings are too

"I use functions of the oven and set them myself in favorites. These I use often." - 3

" I don't trust the programmed functions, even though I can select them, I still set the oven myself" - 3

" I think it is hard to automate food because what is ready? How does a thing know when I find something ready? - 4

Better monitoring and insights

"My future kitchen would have appliances that all communicate information to prevent me and you from making a fuckup" - 4

"Knowing how many degrees each pan, pot etc is would be a great addition. This would make me feel more in control." - 4

"I would like advise if it prevented me spoiling a dish" - 4

"I would appreciate seeing and getting a notice when things area ready. How tings are doing. But I would want to set what information is displayed per heat source or appliance. - 2

"I would like it if a pan would inform me about the current state of the food in the pan" - 1

Smart advice on setting:

"If for example my pizza oven would tell me this setting is the best for this kind of crispness, that would be amazing" - 2

"Technology can understand and know better what and where to measure temperature and when something is good rather than me putting in a needle." - 2

It would be interesting to combine data of ovens of everybody. It could remind you your temperature is 10 percent higher than average with this dish, and you could adjust your oven or tell it is is part of this way of preparing it this time. - 4

Instructions and cooking advice:

"I would like to have a screen that allows me to easily access recipes and instructions while cooking" - 0

"I would like to have something that tells me I have to do this now to finish the overall dish in the end. Lets me focus on one this at a time." -1

"I think it is nice to have instructions in big where I am working. I am moving a lot in the kitchen and I have to move up and down to check what I have to do" -2

"I would like to have advice on how I am doing something. This way I would be able to adjust my cooking accordingly. But I would only use them for special dinners, not for monday meals."- 4

"Amounts are a big problem for me, how much rice do you throw in. How much you need to make, to not throw anything away. I would love to have a pan that would tell me that." - 5

Inventory recipes:

"I would like to have a device that tracks your food inventory. The fridge could say: "ingredients go bad in two days, you could make this and that."-2

"What I like about smart fridges it to know inventory, that I know and can see what is in the fridge" - 3

New cooking technologies to enable new possibilities:

"I expect that in the future we will use other technologies to cook. I hope that for example nano technology would help me make things that would surprise very guest I have.-2

Automatic herbs:

"The one things I would like to fix in the kitchen is a good herb garden. So many people have tried but no one has succeeded. Buying it all the time is so frustrating, and growing is so hard!" - 5

Digital and physical quality:

"I expect premium quality on the software as well as the hardware for the kitchen."-5

14. Updated persona's.

Gut feeling Chef

Name: Joost Blok.
Age: 30 years old.
Relationship: yes.
Children: no.
Job: Architect.
Hobby's: rugby, reading, cooking,

Joost is living in Utrecht with his girlfriend. He works at an architecture firm and loves to create things. He also does this when creating food. His biggest passion next to architecture is food and creating food. Every day he makes new dishes for him and his girlfriend. He always improvises and experiments with new tastes and ingredients.

Likes

He is learning by doing.

Cooking by feeling.

Cooking is doing things with your hands as therapy. It is different from thinking all day.

He regular checks and keeps focus while preparing something.

He is always experimenting and improvising for variation.

Dislikes

He hates to check up on food when it is unnecessary, because it draws him away from the guests.

Challenges

He is uncertain with ingredients, actions and amounts.

Taste is difficult to master and influence.

The timer guy

Name: Kevin de Vries.
Age: 36 years old.
Relationship: Married.
Children: 2.
Job: Senior consultant.
Hobby's: Cooking, traveling, tennis.

Kevin de Vries is a consultant at KPMG in Amsterdam. He has a wife and two children with who he loves to spend time with. During the week he has little time for cooking, therefore likes to keep it simple. He focusses on the food by timing everything correctly, it is his way of keeping control. Other ways of letting off some steam is traveling plenty of time and playing tennis.

Times everything all the time, helps him keep control.

Likes

Taste and result are most important in the end.

He want to always have fresh ingredients with good taste. As well as having the right proportions and the least to throw away.

Challenges

Timing is difficult, mostly for elaborate and new dishes. He wants to leave a good impression.

Dislikes

He dislikes cleaning activities, but does them because they are necessary.

115

Precision Chef

Name: Ella Berends.
Age: 29 years old.
Relationship: yes.
Children: no.
Job: Project manager.
Hobby's: Cooking, Baking, Reading, Blogging.

Ella Berends love to cook, she loves it so much she blogs about it. Because she cooks and bakes, and has to share it to her followers, she is keen on keeping the quality. She is in a relationship but has no children, yet. Other hobbies of her are reading, mostly about food.

Likes

Investing time in cooking is worth it, since she can enjoy the food better.

She like to have control of her cooking by using her Sous-Vide or Steam Oven.

She likes having precision and control because it gives her confidence and guarantee that the result will be the way she wants it.

Automation of certain tasks such as cooking pasta and cooking is appreciated, because they are so repetitive and simple.

Challenges

Temperature control and precision is appreciated for preparing meals but a challenge. She still has to search for the right settings.

She has difficulty with knowing what the inventory is, and what to do make with it.

Dislikes

Not having enough space to put things or plan out where to put things.

She hates automated functions that don't give the right result. She is able to set appliances better than these settings.

Ipad recipe follower

Name: Josefien van der Geest
Age: 34 years old.
Relationship: Married.
Children: 1.
Job: Dentist.
Hobby's: Cooking, walking her dog, eating with friends.

Josefien van der Geest is a 34 year old married dentist with one child. She loves to spend time with her family and is a very social person. When she spends time cooking she does it for her family, but she also tries to come up with new things. Though she is a reasonable chef, she does like to keep recipes and instructions nearby. Therefore she uses the ipad in the kitchen, it is the most important kitchen tool. It helps her reach good quality and spend quality time with her family.

Likes

Using recipes and cooking instructions while cooking.

Socially being together is important.

Online help before, during and after cooking,

Challenges

She uses internet to assist her with challenges and her ipad in the kitchen as assistance.
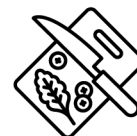
Managing the cooking process is difficult as well as ingredients and techniques.

Dislikes

Cooking can take too much time when she also needs to do others things.

She dislike tedious tasks such as cutting or peeling, because it leads to little results and satisfaction.
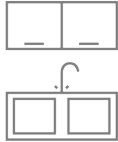
Op welke plekken moet men producten instellen en informatie aflezen terwijl ze bezig zijn met iets anders?
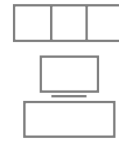
Hoe kun je producten instellen en informatie aflezen terwijl je iets anders doet?

Hoe kun je
(met behulp van connected devices)
temperatuur en timing op een
slimme manier instellen en aflezen
tijdens het koken?

In de keuken

Buiten de keuken

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

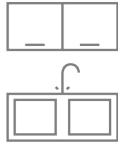Wat zijn plekken waar men
(real time) instructies krijgt
op wat ze doen?

Hoe kun je (real time)
instructies geven op een
activiteit?

Hoe kun je
(met behulp van connected devices)
real time instructies geven tijdens het koken? Zodat je weet hoe het gerecht gaat smaken?

In de keuken
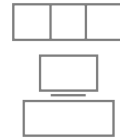
Buiten de keuken

Title Idea

1.	2.	3.	4.
5.	6.	7.	8.
9.	10.	11.	12.

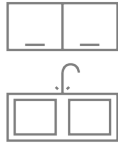Wat zijn plekken waar men
overzicht houdt van producten /
aankopen?

Hoe zou je overzicht kunnen
houden op producten / aankopen?

Hoe kun je

(met behulp van connected devices)

## overzicht houden op je voorraad en advies geven op aankopen en recepten?

In de keuken

Supermarkt

Buiten de keuken

|			
1.	2.	3.	4.
5.	6.	7.	8.
9.	10.	11.	12.

OUTPUT BRAINSTORM

The concept is called the Cool Cooking Top. The top is a combination of a smart camera and projector. 1) It knows recipes based on ingredients that are put on the cooking top. 2) When adding items to the kitchen counter, it gives suggestions of missing items that could be added for creating recipes. 3) it projects at places where there is space, what tools are needed for the process. 4) Than recipes are shown, 5) Videos are shown about how to do certain parts of the process such as cutting an onion. 6) It could also show tips for tools, 7) and tips for ingredients and information about that. For example when you have guests you could tell where it is from and what is in it. 8) It is connected to the other appliances and can already set the appliances correctly to the meal that is made. 9) When placing something on the counter, the projection moves to where is space. 10) It gives active alert when things go wrong. 11) And it control kitchen appliances. 12) In the end it automatically turns of the machines and shows cleaning tips. You could rate and save the recipe you made for another time. And finally it could ask to reorder ingredients you just used.
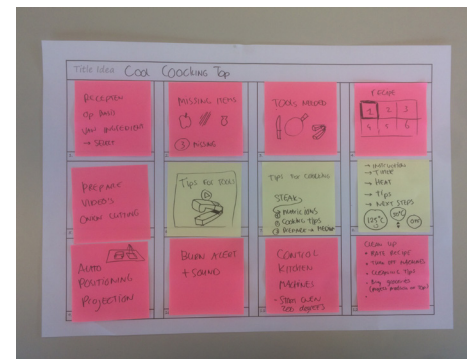
The concept is called the personal cook assistant. The assistant is a voice controlled program that actively helps you cook. 1) At work it asks you what you would like to eat that night, and asks you what you would need to make it. 2) When arriving home the groceries are delivered. 3) It would asks you when you want to eat, and you could answer: "in an hour" . 4) Half hour later it it would ask you to already preheat the oven. 5) In the kitchen you could ask, how many pans do I need? It would say you need two!. The assistant only works if you ask it to help you. 6) When cutting the vegetables, the user could ask it to start cooking the water. This way the user does not have to touch anything and focus on one task at hand. 7) When the water is boiling, which is send through by other devices, it would suggest you to put the potatoes in the pan. 8) And finally when making something new it would tell you how to do something. For example putting the butter in the pan, and tell you after how long to flip a steak. It would ask you, "how would you like to bake your steak?". And it would tell you what to do for what result.

The concept is called the precision kitchen. A kitchen that allows you to be super precise in the way you are cooking. 1) All ingredients are put on the counter. 2) The ingredients are cut and put in the designated pan. the user asks what temperature is good and what time, and setting are applied to the appliances. 3) All different pots and pans are set to their settings. 4) All pots and pans know how long they need to cook. So they start as soon as they need to. 5) They also automatically stop cooking and show or tell you when they are close to done and done. 6) When the user is distracted by something else, let's say a phone call, the kitchen automatically takes over. 7) Through hand gestures the kitchen is set, so time, temperature etc. 8) when something needs to cook a little longer, the user says delay 2 minutes. If possible other setting are changed to this command and continue a little longer with less heat for example.
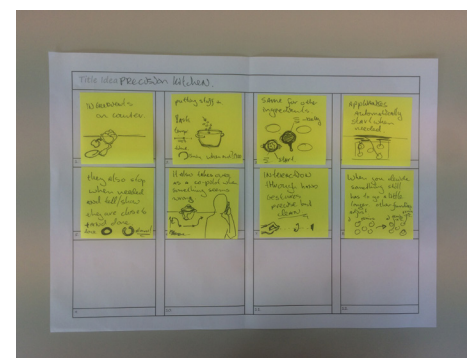
A SHORT DETOUR

The output of the session was translated in new written and drawn post-its to understand what all different ideas meant. These were grouped into new concepts that stole parts of the previous concepts. There were many similar elements in these group of post-its. So they were moved to a separate page where it was more clear what the concept consisted of. Interaction part, products and additional services, notes, factors.

Visual kitchen

Recipes are chosen and pulled from the cloud or personally added. Everything is controlled in the kitchen through hand gestures. A projection is put on the kitchen counter and video instructions searched for on the web by the user can be put on display before or during cooking.

While cooking the system visually shows how far in the process of cooking something is. This visual representation is assumed to help guide the feeling of the user through the cooking process. It shows how the current state of the ingredients is and how it should be.

Precision kitchen

This concept is about giving more control to the user and allowing them to be more precise in the cooking process. It can recognise the ingredients that the user put on the counter top. It will check if all the ingredients are there. It also suggests what recipes could be made.

The system helps to plan the cooking process by letting the user set what exact temperature something needs to be, and when something is finished. Through image recognition the suggestion in temperature and time is done.

Cooking assistant

This personal kitchen assistant proactively helps the users' cooking process, without telling the user what to do. By talking with it, it is possible to adjust appliances and manage your cooking process. This means telling the assistant to put on the fire on pits 1 and 6, and preheat the oven to 240 degrees celsius.

It will proactively ask the user if it could already preheat the oven when it knows you are getting home, or the user could tell it to do so. In combination with a screen it could show information to the user. This could be video instructions or could be a written recipe that is online.

Conclusion:
At first the ideas seemed good and using plenty of connected devices to create a strong system. But the three concepts were all very similar in functionality, viability and realism. They all are practically the same concept only different in interaction through physical control, gestures or voice.

Another problem was that the concepts were all very much dependent on a complete connected system to be functional. Buying a product on its own would not be tempting.

Because of all this it was needed to do more idea generation and diverge again from this point.

Kitchen Hub / AI

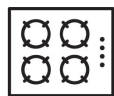**18. IOT canvasses for the final 2 concepts.** *Make sense of the connected mess.*

Connects to:

Hoods	Ovens	Stove tops	Fridges
Sous vide	Tablet	Smart Pans*	*Elsa*

Sensors:

Temperature	Contact	Weight*	Time

Direct related notifications to the user:

Temperature too high	Check appliance ..... (Pit 1, Oven, etc)	Time is up

Additional notifications to the user:

Burn prevention	Prevented boiling over	Step/ Recipe suggestions

Settings:

Set the temperature	Set the time	Play / Pause

Setup connections: | Filter: | Feedback device:

Tablet	AI */ Elsa*	Voice

Result / Enabling of:

Temperature control
Perfect results
Keeping control
Only checking when needed

Impact:

Feel certain, cook confident.
Properly prepared
Less hassle, more cooking.
Hands off quality time
Reminds when needed

Smart Pans

Cook with more confidence.

Sensors:

Temperature Contact Weight Time

Direct related notifications to the user:

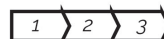Temperature too high Check the pan x amount in the pan Time is up

Additional notifications to the user:

Burn prevention Prevented boiling over Step/ Recipe suggestions

1 2 3
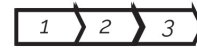
Settings:

Set the temperature Weigh ingredients Set the time

Connects to:

Stove tops (regulation) *Elsa* Tablet (Settings / output)

New Possibilities:

Sous vide Fast cooking Play / Pause

Result / Enabling of:
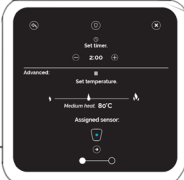
Temperature control
Perfect results
Keeping control
Only checking when needed

Impact:

Feel certain, cook confident.
Properly prepared
Precise cooking.
Hands off quality time
Reminders when needed

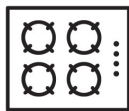|			
The couple decides to eat salmon and that they want it both a little different.	*"I have salmon, potatoes and vegetables and a sauce, Lets start with adding ingredients...."*	*"Oke lets first do the salmon, so that must be in the Fish category..."*	*"Ah look! There we have the salmon.."*
"So there we have the salmon steak, nice that I can see the description!" lets go to steps, whats in there?	*"hmm hey here are the steps, I never prepared a salmon before, nice to look at this once before I start." Lets continue.*	*Wow, that is so nice, I see a video of how the salmon is cut and looks like when done. And I select both soft and dry as the end result!*	*Oke what is this? Oh it needs to calculate time and temperature. It is about 3.8 cm thick, fresh oh and look it gets the red sensor!*
		Ah cool! this is the overview of how the two pieces of salmon need cooking. Lets add another ingredient!	*Now I want to select the vegetables, I have carrots and peas.*
Cool they are in the first page, lets press the carrots and the peas.	*hey I recognise this, another discription. Oke I don't need to read the steps, lets continue...*	*i want them a bit soft.*	*How do I want the peas? A bit crunchy is what we like to achieve :)*

h it needs to calculate time and temperature again. Ill select the slices, fresh and they get the orange sensor.

Great now I have a new overview. wow it just planned everything for me. Great now everything will finish at the right time! Awesome!

Oke now I just need to add the potatoes and the sauce, lets go!

I already saw the potatoes as well, jup there it is.

Overview again, lets continue.

I want them on the crunchy side.

I cut my potatoes in slices and they are fresh as well. these get the yellow sensor.

Allright now just add the sauce... It will not be a regular ingredient. lets try manual input.

Ah great, Here I can just set the timer, or even pick the perfect temperature. Lets do medium heat. Great I need the blue sensor

haha I can name it, ill just call it sauce. Great now I can start cooking.

Awesome the total overview. Im gonna make this more often. So I will favorite this recipe so I will not have to select everything again.

The product will also remember the last setting you used for the products you choose. This way you can just continue each time and be faster the more is cooked

Usertest plan:

The impact:

"To assure the quality of their food and more control over their cooking, by giving actionable feedback and advice at the right time."

The scope:
The usertest will cover the impact of the product, and will test if the product is able to achieve this hypotheses. Other goals are to discover if the use of cooking with the product gives confidence to the users of the outcome of their cooking as well as about giving them a feeling of control.

Research questions:

Main research question project:

- What is the effect on the users' practice of cooking by introducing new data-enabled technology that create, use and present data directly within this context?

Main research questions test:

- Do people feel more in control of their cooking process?
- Do people feel they can reach better quality food when using the product?

Location:

The tests will take place within the weeks of 11 december and 1 january at the homes of the users.

Sessions:

The sessions will take **one hour** to complete.
Therefore I will ask the participants **1,5 hours** of their time.

- Before the test I will take 15 minutes to setup everything properly.
- The scenario will take 30 minutes in total, with 5 minutes of setting up and 25 minutes of cooking. I will have done the preparations.
- The questions will take another 15 minutes to ask.

Equipment:

- Laptop;
- Sms website: https://globfone.com/send-text/
- Prototype.
- Ipad;
- Ipad Stand;
- Fake recipe;
- Smartphone as videocamera.
- Smartphone camera stand;
- Food to cook with;
- Fake sensors to put on the pans;
- Consent form
- Interview sheets
- Chargers

Participants:

6 People will participate in the test, with the possibility of one cancelling the test session.

Script: (in dutch

Vandaag ga je een nieuw product voor in de keuken uit testen. SJEF is een tool om je te helpen tijdens het koken en het werkt als volgt. Je selecteert wat je gaat maken, zet de sensoren op de juiste pan, en vervolgens ga je koken samen met SJEF. Het recept heb ik op dit blaadje staan en dit probeer je eerst samen te stellen op SJEF.

Je gaat eerst beginnen met instellen, daarna gaan we koken. Probeer door te geven aan SJEF wat je gaat maken vandaag. Terwijl je dit doet, vraag ik je wel om hardop te zeggen wat je denkt. Dus zodra je ergens op drukt, of je kunt aangeven wat je nu denkt en wat je verwacht of denkt en ziet dat er gebeurd.

Nadat het de testpersoon gelukt is om het allemaal in te stellen ga ik hem/ haar vragen of hij/zij klaar denkt te zijn om te koken.

Ben je klaar om te koken? Ok.

Laten we beginnen!

Vervolgens zeg ik, druk maar op play, en zal de video starten en zal de testpersoon beginnen met koken.

Deurbel:

SJEF: Het is tijd om de zalm te draaien.
Keer snel terug naar de keuken!

Vragen:

Nu heb ik wat vragen over SJEF. Het is dus een product die nog niet af is. Maar ik ben heel benieuwd wat je van het concept vind en wat er anders kan voor het een echt product wordt. Het gaat er nu om dat we niet teveel in detail gaan over waar een knopje zit op de app, of met welke animatie iets verschijnt, maar meer over het concept als geheel. Alle feedback is welkom, ik zal alleen soms even bijsturen dat de feedback goed gericht is op het concept.

1. **Laten we het eerst hebben over het Recept samenstellen:**
   a. Zo dat ging goed! Hoe vond je het zelf gaan?
   b. Snapte je waarom je alles moest instellen?
   c. Hoe makkelijk (1) of moeilijk (5) was het samenstellen van het recept?
   d. Wat maakte het makkelijk?
   e. Wat maakte het moeilijk?
   f. Wat zou je (anders) verwachten bij het instellen van je recept?
      i. Zijn die verwachtingen uitgekomen?
2. **Oke nu gaan we verder met de Meldingen:**
   a. Wat voor invloed hadden meldingen op het koken?
   b. Hoe betrouwbaar vond je de meldingen van SJEF?
      i. Waarom?
   c. Als alles zou werken, wat voor meldingen zijn dan waardevol, welke niet?
      i. Waarom?
   d. Wat voor soort meldingen mis je nog of zou je verwachten van een werkende SJEF?
   e. Welke meldingen zou je absoluut niet willen hebben krijgen?
      i. Waarom?
3. **Effect van SJEF op (het dagelijks) koken. (practice)**
   a. Wat vond je goed aan SJEF? / Wat vond je niet goed aan SJEF?
   b. Maakte het koken met SJEF het koken makkelijker (1) of moeilijker(5)?
      i. wat maakte het makkelijk?
      ii. wat maakte het moeilijk?
   c. Wat voor invloed had SJEF op je timing?
   d. Denk is terug aan wat je had willen bereiken met het koken, denk je dat SJEF hieraan heeft bijgedragen?
      i. op wat voor manier?
   e. Hoeveel vertrouwen had je in SJEF toen je wegging om de deur te openen / andere dingen te doen?
      i. waarom? / kun je dit toelichten.?
   f. Wat zou je verwachten dat SJEF nog meer zou kunnen doen?
   g. Hoe zou SJEF je koken nog meer kunnen ondersteunen?
   h. Alles alles werkt voor betekenis zou SJEF voor je hebben, ook tot de relatie voor wie je kookt?
   i. Hoe zou SJEF je dagelijkse manier van koken veranderen?
   j. Als alles naar behoren zou werken,
      i. wat voor invloed zou SJEF op je kookproces hebben? (Meer of minder)

ii.   wat voor invloed zou SJEF hebben op het eindresultaat? (Beter of slechter)

k.   Wanneer zou je SJEF gebruiken? en wanneer niet?

l.   Als je vanaf morgen zou koken met SJEF, zou je dat willen?

4. **Ten slotte wil ik nog de uitvoering bespreken.**
   Sensor laten zien en geven.

   a.   Hoe zou je het vinden om te koken met een sensor aan je pan?

   b.   Andere uitvoeringen zouden kunnen zijn dus:

   i.   Een app met sensoren. / Apparaat met sensoren.

   c.   Hoeveel zou je voor SJEF betalen?

   i.   De sensoren?

   ii.   Als apparaat met sensoren?

   iii.   SJEF als app?

   d.   Wanneer zou het te goedkoop zijn?

   i.   De sensoren?

   ii.   Als apparaat met sensoren?

   iii.   SJEF als app?

   e.   Wanneer zou het te duur zijn?

   i.   De sensoren?

   ii.   Als apparaat met sensoren?

   iii.   SJEF als app?

   f.   Hoeveel zou nog net wel betalen ook al is het vrij duur?

   i.   De sensoren?

   ii.   Als apparaat met sensoren?

   iii.   SJEF als app?

   g.   Welke uitvoering zou je het liefst mee koken?

   i.   De sensoren?

   ii.   Als apparaat met sensoren?

   iii.   SJEF als app?

Heel erg bedankt, dat was de test en bedankt voor het meewerken!

Zalm:

1. Smelt 1 eetlepel boter op middelhoog vuur in een anti aanbakpan tot het goud kleurt, ong 1 minuut. 2. Kruid de zalm met peper en zout en doe in de pan met het vel omlaag. Kook zonder te draaien 6 minuten. Je wilt een zalmmoot medium en de andere zalmmoot gaar. 3. Draai de vis en bak op smaak, 2 minuten langer.

De groenten:

1. Zet een ovenplaat in het midden en een ovenplaat in de onderste laag van de oven, verwarm de oven tot 200°C. 2. Maak de wortel en de broccoli schoon. Vervolgens snij de broccoli in roosjes en snij de wortel in schijfjes (halve cm tot 1 cm dikte) 3. Verdeel de broccoliroosjes over de ovenschaal, en schenk er een eetlepel olijfolie overheen en een halve eetlepel zout. Meng het vervolgens goed en verdeel het gelijk over de ovenplaat (of schaal). 4. Rooster de groente in de oven voor 10-15 minuten dan zijn ze lekker stevig met bite. 5. Haal de schaal uit de oven, bestrooi de groenten met knoflook, rode peper.. Rooster vervolgens voor nog 2 minuten.

De aardappelen:

1. Schil de aardappelen. 2. Kook ze in 15-20 minuten kruimig. 3. Giet af, doe een beetje boter of olijfolie in de pan bestrooi vervolgens met peterselie en roer goed door.

Saus:

1. Roer met een garde de inhoud van dit zakje met 250 ml koud water in een pan. 2. Breng dit al roerend aan de kook. (100 graden in de pan) 3. Voeg eventueel verse ingrediënten toe en laat de saus nog enkele (2) minuten doorkoken.

Hollandaisesaus zelfgemaakt:

Smelt 100 gram boter in een pannetje totdat het helemaal gesmolten en goed heet is, maar niet bruin. Giet de gesmolten boter in een schenkkannetje (bijvoorbeeld een maatbeker met schenktuit). Doe 1 grote eidooier of 2 kleine eidooiers (op kamertemperatuur) in de hoge beker van je staafmixer. Voeg een theelepel water, wat citroensap (of azijn) en zout toe. Zet je staafmixer erin en zet 'm aan. Vervolgens giet je, superlangzaam de gesmolten hete boter erbij, in een heel langzame straal. Niet te snel gieten! Langzaam zal de saus dikker worden.

22. Consent form validation.

Toestemmingsverklaring

Onderzoek: Kookliefhebbers en internet of things.

Uitvoerende onderzoekers: J.L. Koghee   jorickoghee@hike.one
Projectcoach: Dr.ir. Stella Boess   S.U.Boess@tudelft.nl
In opdracht van: TU Delft
Locatie: ....

In te vullen door de deelnemer
Ik begrijp en heb geen bezwaar dat dit onderzoek met beeld en geluid zal worden vastgelegd. Ik ga akkoord dat alle resultaten van het onderzoek vertrouwelijk zullen worden behandeld en anoniem zullen worden verwerkt. Daarnaast ga ik akkoord dat het beeld en geluidsmateriaal mag worden gebruikt voor de afstudeerpresentatie van Joric Koghee.

Ik stem geheel vrijwillig in met deelname aan dit onderzoek en erken een kopie van deze toestemmingsverklaring te hebben gekregen.

Naam deelnemer: Handtekening deelnemer:

....

Datum: ....

In te vullen door de uitvoerende onderzoeker
Ik heb een mondelinge en schriftelijke toelichting gegeven op het onderzoek. Ik zal resterende vragen over het onderzoek naar vermogen beantwoorden.

Naam onderzoeker: Handtekening onderzoeker:

....

Datum: ....

23. Validation test data:
Impact:

Keep:

Cooking with SJEF was experienced differently by the participants, but because the test was more generative these are the most common conclusion on the impact SJEF has on cooking.

Users experienced that when using SJEF, their daily timing would improve. Since Sjef is constantly paying attention, it requires users less amount of thinking that they would normally have to do, users are more relaxed with cooking since Sjef is focusing on that all the time. Because of this, Sjef makes cooking easier. "I don't have to think when something needs to be done, I only have to follow the recipe and what it says." Now to be clear this was not always and all the time experienced like this, but how they would expect a working Sjef to behave.

Sjef would prevent them from making any mistakes. And because of both of these factors, it helps with making the quality better. Since it allows you to be ready at the right time, without forgetting an ingredient or having to put a part of a dish on the side. Like on of the users said, you don't want to have a cold steak because you are waiting for the potatoes. It therefore solves the big challenge of cooking to make sure everything is finished at the right time.

One of the participants even said that if Sjef would be real, the participant would cook with SJEF 5 to 6 days a week, since the recipes are always different and recipes are used almost everyday anyhow. And because it tells you what to do and when to do what.

Overall all users would especially like to use SJEF when meals start to get more complex. Cooking with SJEF would allow for more variation in cooking, since SJEF can also guide with complex new meals you would otherwise not dare to do.

To be improved:
Because of limitations of the prototype, and this being the first attempt at designing a product like Sjef the effects of Sjef were not always as hoped. Sjef causes sometimes more stress then necessary because of the planning of the notifications of the prototype. This was due to the fact that the sensors were not sensing anything, and Sjef was basically a video being played, not responding to any actions taken by the user.

To add:

A way of learning the timing of the user, so Sjef learns how long people are doing on preparation of certain activities and can make more personalized and better recipe schedules the more you use it.

Other more experienced cooks would use Sjef if it was supported by a big database or client such as Hello Fresh, Albert Heijn, Jaime Oliver, Marleyspoon. Allowing for a lot of recipes to look at and use while cooking as a guideline.

Recipes:

Keep:

The way recipes are shown on Sjef was very positively experienced. It was very clear what was going on and needed to be done at that moment. The overview with the time line the users could already guess what kind of things would needed to be done when.

The app of Sjef on its own without sensors is doing already over 50% of the work, might already be interesting to further develop this solo.

To be improved:

The way of selecting your recipe now is too complex, takes too much time on a daily basis and too elaborate. It took some participants 10 minutes to make their recipe that time, which was fairly simple. They did not see them creating their recipe each and every day like that on a device. It was not how they expect technology to work nowadays and another solutions should be proposed.
Some steps such as selecting something customized for example a sauce, and selecting minutes temperature and a sensor became such a technical way of working, it was even too complex for some.

To add:

Participants expected SJEF to have a database of recipes which would be combined with a partner company or website. As partners the participants talked about Hello Fresh, Albert Heijn, Jaime Oliver, Marleyspoon, Smulweb and others. This way the user can select a meal quickly and start cooking instantly, instead of selecting and creating their recipe on the spot.
Another feature that was talked about, and could be an addition or al alternative way of selecting your recipe, was the ability to scan a recipe. SJEF would then translate that scan to a recipe it could use.

Especially for cooking experts and professional cooks, Sjef gets interesting as soon as there is a big database supported, this way they can use it always and that extra bit of guidance is always appreciated. Especially when things get more complex. It would not be the case professionals would be depending on it, but it would remind them properly during the process to do certain necessary actions.

The prototype was currently only focused on the cooking, not the preparation. During the tests it was very clear that they expected SJEF to also include that part of the cooking process.

Another feature that was talked about was the ability to set your level of cooking. This would then give more or less instructions with creating a meal (in terms of messages, instructions, videos, text etc)
Would be nice to get a view on how certain methods or techniques need to be done if you never did them before, to get some guidance in that. These tips and tricks displayed at the right time could help in preparing the meal properly. This also links nicely to the cooking level, if you are a good cook you might not need to view these, as a novice cook you might want to check these out more often during the process.

Notifications:

Keep:

Participants were positive about the visual styling of SJEF, is was clear and professional.
The notifications were clear because they were very visual, supported with video. They almost did not need the text to understand what was going on.

The notifications that were given by SJEF were all appreciated, some things they could see themselves (such as when to turn the salmon) but though these notifications for some might be self explanatory, they were not seen as annoying. Also the way they are presented to the user, direct and clear are good since you are in operational work flow during cooking.
Notifications such as checking the oven again, or turning those vegetables is something the participants said is an action they often forget. Getting notifications when to get things out, turn things, do something to get a different taste are great reminders.
Notifications such as "turn the vegetables", "if you remove it now it has the most bite" that kind of advice were seen as great ways of being reminded during cooking to increase the overall quality of the meal.

What they also liked was that Sjef would adjust its planning in the case the user is somehow delayed. So when you are taking longer to get the water to cook, Sjef would wait and postpone every other things until you completed that step.

To be improved:

Pop ups are right now blocking the time line, which should always be visible to see what is going on and coming up so you can prepare for the next step. Notifications are displayed too short and should be visual longer since it happened plenty of time they missed things.
What participants were missing was to get notifications about for example to set a pan for the next step, to prepare, or to clean your kitchen, those kind of things.
They also were missing the information about what tasks are coming up, a good overview of all tasks in the beginning somehow was expected. They were very unsure about what it would be saying all the time.
The prototype was forcing people to do too much in the beginning, would be nice if SJEF would plan everything in such a way that the user always has enough time for each task.
During cooking some of the user has a more loud or more quiet kitchen. This caused problems for some when some of the notifications were missed because the sound of the notifications was too soft. The sound that the notifications give should be more clear than the sound that was used in the prototype.
An alternative that was suggested multiple times was voice notifications. Though opinions were mixed, participants did all think it would be a good addition in case you can't look at that time. But this should always be an option, some said the way it works now would be fine for them to use and the talking would only be experienced as annoying.

To add:
Sjef to learn how long it would take the user to do tasks such as preparation so it can schedule these in breaks while cooking.

Materialisation:

Keep:

The prototype was not supported by working sensors. If the sensors would work, they could give greater guidance and measure the exact moment when something needs to be done. It would be very nice to be precise in temperature and especially be beneficial when preparing meat. Participants think that the sensors would be a great tool to be more certain during cooking and be confident about their cooking. For example poaching an egg, it is very hard to know whether or not the water is 60 degrees, the sensors could perfectly help with that.
"Normally I would do temperature by feeling, being more supported by such sensors is really nice to give more input that the temperature is right and the salmon can go in now."

See SJEF as an app that you would download rather than a dedicated device that you would need to buy.

Others also talked about that the sensors would not be that necessary, and the SJEF app would function for a great amount on its own.

To add:

The amount of money they were willing to spend on the sensors was very low. They would rather spend more money on pans with integrated sensors than spend a big amount of money on sensors.