Mobico

Where mobility meets cooking

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Introduction

The car industry is changing very rapidly. Ranging from adaptive cruise control to auto lane keeping, cars are getting better and better at driving themselves. While today we need to be alert in case something fails, twenty years from now, cars might truly be self-driving.

With changing features of the car, comes changes in the car's interior. With a full level 5 autonomous car, the interior no longer needs a steering wheel, a gas- or brake pedal. This leaves room for new appliances in the 'old' and traditional car interior. For this project, Daimler AG challenged us to design an interior for a future level 5 autonomous car with dimensions of 2,00m x 1,60m x 1,20m.

Going through many and many options, the team behind project Mobico came to the idea of integrating a kitchen in a moving vehicle. This required several very basic tools and objects to be redesigned from scratch, and rethink the structure of a kitchen. The process and outcome of this project are described in this report.

Acknowledgements

People who have contributed to our project:

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- Zane Amaralis and other colleagues from Daimler
- Karin Bos, product trainer at Inspiratiehuis 20|20
- Keukendepot Eindhoven
- User test participants

Project goal

As mentioned, Daimler AG challenged us to design an interior for a future level 5 autonomous car. Project Mobico is not meant as 'the' solution for this challenge. Instead, its goal was to explore new possibilities for autonomous car interiors and prove the car interior can be much more than what it was initially designed for. For this design, the group set several requirements:

- The interior should fit the Mercedes (Daimler AG) design style
- The interior should be sustainable
- The interior should be comfortable
- The interior should be meant for a sharable car (car sharing)

Process

The process of project Mobico was different from a usual design process, containing a significantly stretched ideation phase. At the very beginning of the process, the group tried to develop an idea which was both feasible and innovative, which resulted in proposing and rejecting many different ideas.

Ranging from a hotel on wheels, to communication enhancement in the car, to building a kitchen inside a moving vehicle, the latter was chosen to be the subject of the project. Shortly after starting with the conceptualization phase however, their doubt in feasibility started to rise due to several opinions from outsiders and professionals. This caused the group to reverse back into the ideation phase and explore multiple other ideas.

What followed, were two key moments within the project. First, the group realized the cooking concept would not necessarily be the absolute future for the car, but could instead serve as an exploration for new appliances in the car industry and prove car interiors are suited for unusual purposes. Secondly, the client showed to be enthusiastic about the cooking concept and believed for it to be a feasible project.

This motivated the group to proceed and conceptualize the cooking idea. As it was not possible to build an entire kitchen, the group focused on three main elements from cooking and went through the following iterations:

1. Cooking water
   - Rough design
   - Physical prototype
   - Electrical components (user feedback/input)
   - Locking mechanism (lid)
2. Cutting with knives
   - Ideation
   - First prototype
   - Second prototype (incorporating feedback)
   - Final design (incorporating feedback)
3. The placement in the car

During the iterations, the group met with several experts and performed user tests to validate the design choices. This ensured the concept could quickly adapt to user and market desires. Parallel with these prototypes, a business plan was developed, which was necessary to determine the interaction with- and ownership of the car.

Cooking pot design

The following iteration design process describes the visualization and beginnings until the finishing touches of the cooking pot. Its timeframe starts at the midterm demo day, where the decision was made to continue with cooking inside of a car, until the end with the final presentation at the demo day. The goal of the cooking pot is to produce a final prototype that showcases how cooking inside of a level 5 autonomous vehicle could be possible in the future.

Rough Design

Beginning, the first fully worked out prototype of the project had to start with a visualization. How would a cooking pot inside a moving vehicle look like? Since such an idea was not worked out before, there was no reference to look at and it all had to start from scratch.

Looking at an ordinary cooking pot, what are the necessities to have? A heat source, a supply and drain of the medium in which ingredients are cooked and a cooking pot itself. When designing such concept, it was decided that an overarching main priority of safety must be maintained while cooking inside of a vehicle. In order to fulfill this design problem, requirements needed to be set.

The first requirement being: The cooking pot needs to be fixed to the table, since a boiling hot object should not move around. To accomplish this, multiple ideas were considered, ranging from a magnetic system to twist lock system. The more ideas were considered, the clearer it became that the traditional cooking pot had to be redesigned entirely to fit inside a vehicle.

Image 1 - Click system

One of these solutions was to use a gyroscope like system for the cooking pot to keep it level. This counteracts the movements of a moving vehicle and thus helps a surface keep in balance. However, if the user needs to add ingredients in the cooking pot, the cooking pot could be in an angle due to the gyroscope while adding ingredients. This was not not chosen because of its complexity.

The most proficient solution thought about was to 'click' the cooking pot into place and then turn it so it would be fixed, a kind of locking mechanism. This meant that the pot would be steadily into place and not be able to move and lift from its position while inside of a moving vehicle. A prototype was made of this idea and showed to multiple experts to give an expression of how the cooking pot would be locked in the table. The responses from experts and our client were positive. After some testing however, it was found that is was rather difficult to align the system in the correct way. Therefore it was adjusted to a new 'open ring' design that allowed the pan to be in any rotation (Image 2).

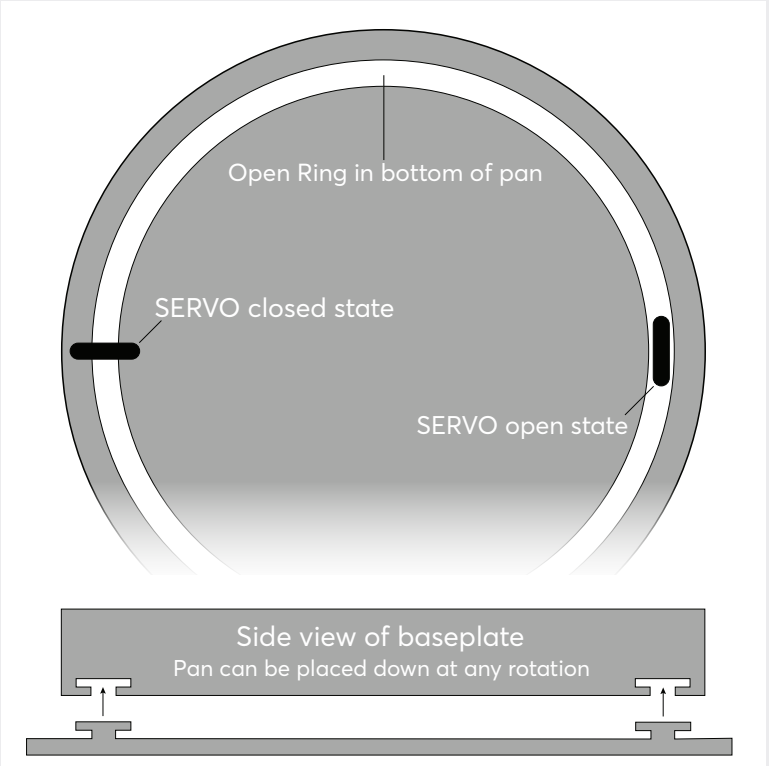

Image 2 - Open ring system

Another important requirement is that water must not get in contact with the user, both in its cold and boiling state. The water could not be supplied by the user from the top, e.g. having an emergency brake during filling or draining. This needed to be avoided completely. To let this happen safely, the water had to be supplied via another way: the bottom. Clean water could be displaced from a reservoir leading into the bottom of the cooking pot and when finished cooking, could be displaced out of the cooking pot from the bottom to another water reservoir where unclean water is stored. This means that the lid of the cooking pot would not come off during the cooking process but only before and after.

Although this system solves a big safety problem, the user would not be able to see what is happening while cooking. Therefore, another way of giving the user insight in the cooking process had to be found. While the cooking process is active, the user needs to be informed on its status. This would mean the stage of the cooking process needed to be translated into a form of feedback for the user. The electronics part of this report will elaborate on this.

Moving forth with having the safety aspect in mind, induction cooking was chosen as heat source. The choice of induction cooking comes from its safety aspect. While conventional gas cooking has direct heat created by flames and a supply of gas, induction cooktops are powered electronically and only heat the directly attached object. Therefore, there will be no danger of injuries since the cooking pot is fixed in place.

Having thought about the ideas and principles behind the cooking pot, its appearance is the last thing that has to be thought about. When making the final prototype of the cooking pot, dimensions had to be set. The diameter of the cooking pot was set on 25 cm and looking at ordinary 25 cm cooking pots, the average height was 20 cm. Therefore, a 20 cm high cooking pot with a diameter of 25 cm was chosen.

Physical prototype

While most of the prototypes could be made from MDF or any other type of wood, the cylindrical part of the cooking pot was the challenging part of the prototype. Although the option of making the cylindrical part of the prototype from MDF, it was chosen to make it from a different material. Since the curvature of the wall has to be very precise and neat, it was chosen to make it from PVC. Polyvinyl Chloride (commonly known as PVC) is known for its usage in small sewer pipes, which are cylindrical. Due to this, PVC was chosen for the cylindrical part of the cooking pot. The height that was needed was cut off the pipe and sanded down so it was ready to be spray painted. Before this could happen, small intakes were made to fit electronic wire in them. Sensors needed to be placed under the laser cut handles, so pressure could be sensed.

Furthermore, the base, the handles and the lid of the cooking pot had to be made. Although the base and lid could be made by hand, this would never turn out to be exactly round. Therefore, it was chosen to laser cut the wooden base, handles and lid, so they would fit precisely. The base consists of multiple wooden round layers that, glued on top of each other, would create the base. The lid was made in a similar order, having it laser cut so it would fit accordingly. The handles were made with the end parts in the same curvature of the cooking pot, for a nice and snug fit.

To let the prototype look like a real cooking pot, it had to be given a real metallic color. The PVC and wood were sanded down and afterwards spray painted first in a white primer and later in a metallic coating. Having the same shape and color of a traditional cooking pot, the prototype made began looking as a real product.

In order to physically close the lid of the cooking pot, it was thought to place two servos on the inside of the cooking pot and let the lid lock itself inside of an extra wooden laser cut ring. Both servos were linked to a pressure sensor at the bottom of the cooking pot and when pressure was sensed, the servos would turn 90 degrees.

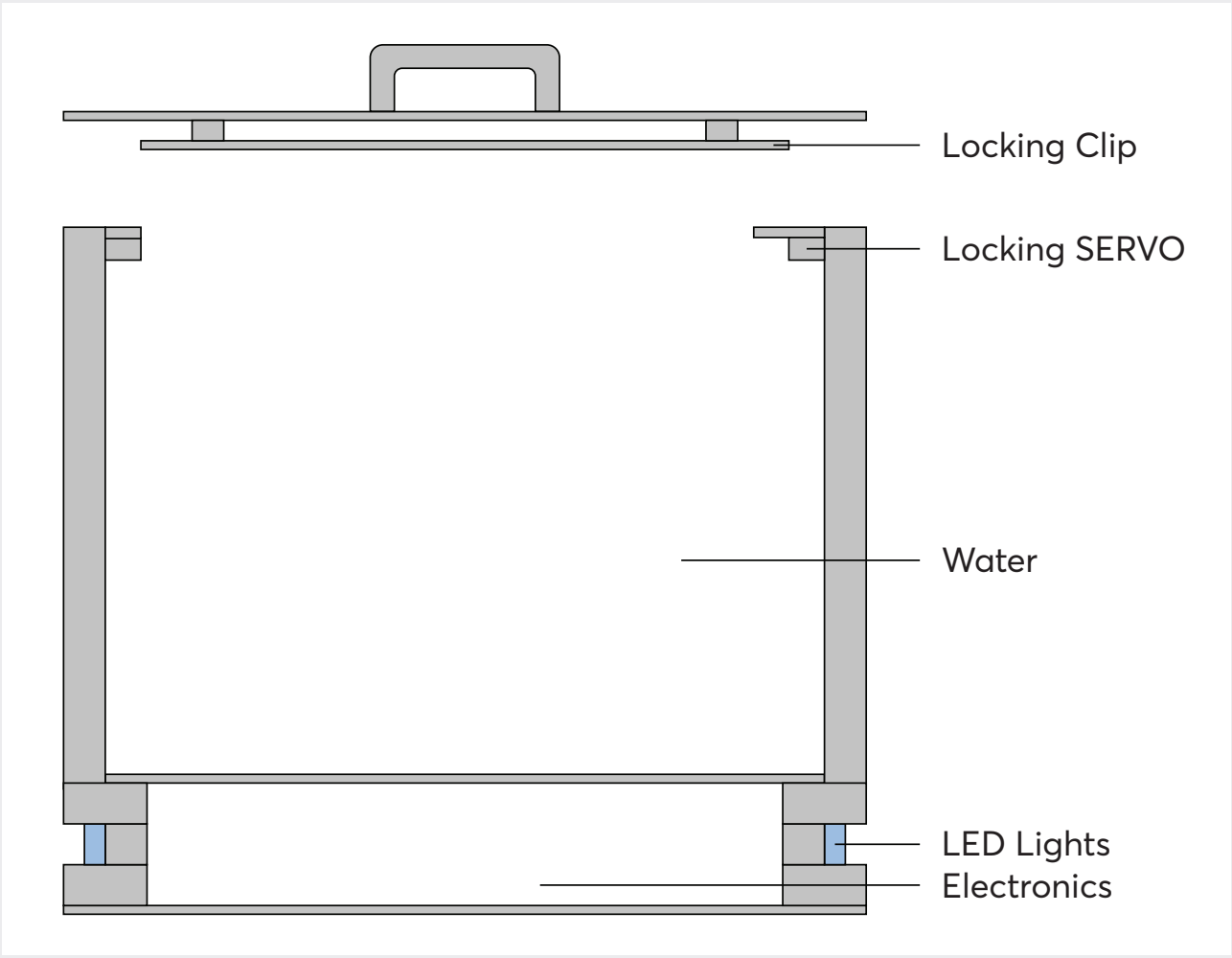

Image 3 - Physical building plan for cooking pot

Electronics
Since cooking in a moving vehicle requires many safety measures, the interaction with the kitchen tools is more difficult. For example, you are not able to see the water while cooking to prevent it from spilling. Therefore, the group aimed to create a system that was able to give and receive user feedback. To achieve this, several electronic devices were used to display multiple stages in the cooking process.

To indicate what the pan is doing at any given time, light indicators (a ring of lights around the bottom of the pan) were incorporated that displayed several patterns that corresponded with different stages. The different stages were defined as: filling with water, heating, cooking, draining, finished. For each stage, a different light pattern was used:

Stage	**Light pattern**
No activity	No lights
Filling water	Blue strip of light rotating around bottom
Heating	Full blue ring of light changing to red
Cooking	Full red ring timer filling around the bottom, in line with the time
Draining	Blue ring of light turning off from left to right
Finished	Full green ring flashing green 3 times

After a user test, it became clear that the patterns for heating and cooking were not clear to the user. The sudden change from blue to red in the heating stage was often recognized as an error indicator. The full ring of LEDs was not suitable for a timer since the LEDs at the back of the pan are not visible. Along with the changes to the light indicators, it was decided to implement haptic feedback to the handles of the pan. This could be used for warning the user in case the pan was grabbed during cooking. This resulted in the following:

Stage	**Light pattern**	**Haptic feedback**
No activity	No lights	Not measuring
Filling water	Blue strip of light rotating around bottom	Active when touched
Heating	Full blue ring of light fading to red	Active when touched
Cooking	Red timer of 7 lights filling up, in line with the time	Active when touched
Draining	Blue ring of light turning off from left to right	Active when touched
Finished	Full green ring flashing green 3 times	Not measuring

After the testing, the haptic feedback was understood well by the user and was associated with "wrong". Also, the fading effect from blue to red in the heating stage was now understood as heating instead of an error. Finally, the timer was now readable. To realize the locking mechanism of the lid, two servo motors inside the pan were connected to the system, locking and releasing the pan at the right moments. Together with some final adjustments to the lights, this resulted in this final system:

Stage	**Light pattern**	**Haptic feedback**	**Locking system**
No activity	No lights	Not measuring	Opened
Filling water	Blue strip of light rotating around bottom	Active when touched	Closed
Heating	Full blue ring of light fading to red	Active when touched	Closed
Cooking	Red timer of 7 lights filling up, in line with the time	Active when touched	Closed
Draining	Blue ring of light turning off from left to right	Active when touched	Closed
Finished	Full green ring fading on and off until pan is lifted up	Not measuring	Opened

Finishing touches

With the final prototype of the cooking pot coming together, it had to be tested frequently. These tests resulted in the lid not closing properly. To fix this, the curvature of the inside of the most bottom layer of the lid was sanded down to let the servos move more easily in their locking position. Moreover, the LED strip that is used to give visual feedback to the user of the cooking process its stage needed to be diffused. In its pure form the LED's were too bright and the overall finish not looking very neat. Plastic strips cut perfectly in the size of the gap in which the LED strip lies were cut and put inside of the dent. Eventually four layers were needed to achieve the right amount of diffusiveness.

Image 4 - Final cooking pot prototype

Cutting mechanism design

This iteration will describe what happened in the design process from the moment the group decided to continue with the kitchen inside a car. The timeframe of this iteration is from the Midterm Demoday until the final Demoday. The goal of this iteration is to design a knife which is safe to use inside a moving car.

Ideation

From the analyses in necessary kitchen tools [see appendix 2] and the observations of the cooking process [see appendix 1] it was concluded that cutting food is an important part of the cooking process. Therefore the option to cut food in a fully autonomous car would be a necessity. The process of cutting food had to be re-invented, since there is always a possibility that the car has to divert or brake. The process started with making sketches, which eventually led to a concept.

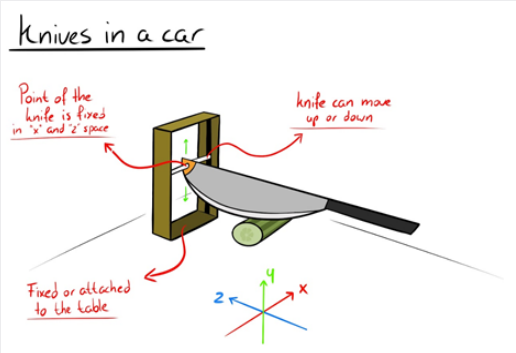

Image 5 - First cutting mechanism

First prototype

The decision was made to start with building a prototype so that tests could be done. With this prototype the knife can only be moved up- and downwards. A wooden knife was made that fitted the prototype, making it a simple prototype to get some general feedback.

A meeting was planned and held with Daimler AG, it was done over Skype. This meant that they were not able to test the prototype. However they could see the potential and gave some valuable feedback. For instance, the knife could only cut up and down and they said that there should be more freedom with the knife. Daimler also suggested to use a magnet so that the device could rotate and therefore give the user even more freedom in cutting [whole meeting described in appendix 7]. Later on in the process, the group had a meeting with experienced product trainer K. Bos from inspiratiehuis 20|20. Although she was not specialized with cutting devices, she was positive about the concept [whole meeting described in appendix 4].

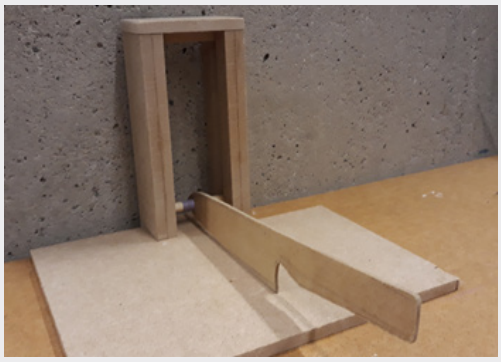

Image 6 - First cutting protytype

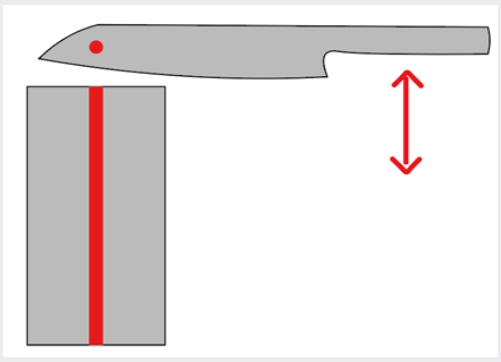

Image 7 - First knife path

Second prototype

Before starting on a new prototype, it was decided to film the process of cutting and analyse the cutting motion. This was useful since it was seen that the cutting motion is not just one slice downwards. There is a slight bend in this motion and at the end the user is tended to pull the knife towards them. In order to accomplish this motion a path was designed [as can be seen in figure …]. Furthermore a notch was made so the user could place a product in front of the case and keep it steady.

After the prototype was finished, some user testing was done. Where students were asked to use the second prototype, without giving any further explanation. It was noted how they handled the system. Afterwards they were asked what they thought of it [for more information see appendix 6]. From these user tests several conclusions were made. The path of the cutting motion was sometimes restricting the motion of the user.

However, it was also seen that almost all students, after a few tries, got the hang of the movement and said that the movement was pretty smooth. Furthermore, if the knife was turned on its side it would exit of the mechanism. In order to make this essential cutting move as pleasant and safe as possible, it was concluded that firstly the pulling part of the motion had to be removed and secondly figure out a way to prevent the knife from exiting the case.

Image 8 - Second cutting prototype

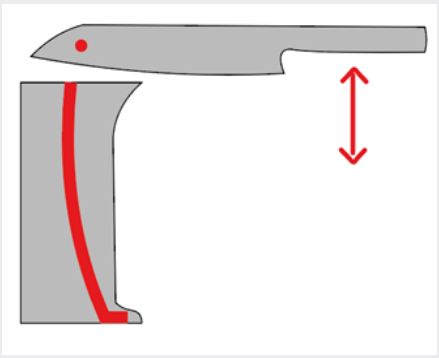

Image 9 - Second knife path

Image 10 - User testing second prototype

Final Design

With all the feedback analysed, a system was inserted that prevents the knife from accidentally exiting the case. A T-shape outline was used for the path the knife should follow, where only a T-shaped stick would fit [as can be seen in image 11]. First, it was thought to make the stick from metal, since this would be very strong. However due to not being able to make the T-shape form metal, it was chosen to make the stick from wood. Another feature of this prototype is the magnet underneath the case. The magnet allows the case to rotate and the case can be pulled of and stored in a cabinet. As the case could rotate, both left and right handed users could use this system.

All in all, the method that was used in this iteration was trial and error. Multiple prototypes were made and tested, after analysing feedback from experts and users, a new and better prototype was made. Before assembling the final prototype it was carefully looked upon which features from the previous prototypes would be best to implement. Although the goal that was set in this iteration was met, there are aspects that could be improved. First of all, the smoothness of the motion could be improved, this could be solved with a 3D printed version. The gap would be way more precise than a handmade prototype of wood. Secondly in order to make this system as functional as possible the prototype should be lower, now is it unnecessarily high.

Image 11 - T-shape outline for knife placement

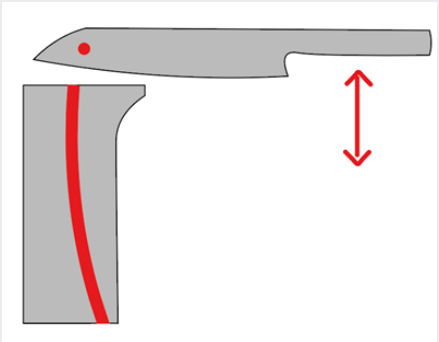

Image 12 - Final knife path

Image 13 - Final cutting prototype and design

Interior layout

The main requirement for the layout was the dimensions of the space that was given with this project. 2.00 x 1.60 x 1.20 (LxWxH) . With the ideation phase the group did research about kitchens inside yachts / planes / foodtrucks / campervans. And it was concluded that in order to make a functional kitchen, we needed to pay attention to the "working triangle" (Kohler Co., 2018).

This triangle forms between the sink, fridge and stove and prevents people from walking in each other way. With the triangle in mind multiple layouts were designed. The triangle is visualized by the red line. In the second layout the triangle is bigger because there are two countertops. Resulting in a better functioning kitchen. From this point onwards the group developed this base layout. The kitchen is based around a rotating and moveable chair, because the height of the space is only 1.20m. When the user sits in the car the chair is facing forwards, the reason for this is to prevent motion sickness. Other features in this interior, to make it as functional as possible, are a smart dishwasher and a easy changeable garbage bin. [can be seen in image 16]. The dishwasher is based on the IKEA concept kitchen, it is a cabinet and dishwasher in one (Ikea Concept Kitchen 2025, n.d.). Move the sliding door and clean tableware appear, at the same time on the other side the dishwasher is now turned on. The garbage bin is placed at the side of the car and can be changed at the service station from the outside.

To finalize the layout the group had a meeting with "Keukendepot Eindhoven". We proposed the layout [image 16] and received some useful feedback. The main point was that the sink should be as close as possible to the cutting area to wash products. Furthermore they commented that the cabinets should be placed so that they do not block daylight. Otherwise the interior could create a dark and cramped atmosphere. All feedback considered, a new and final layout was designed.

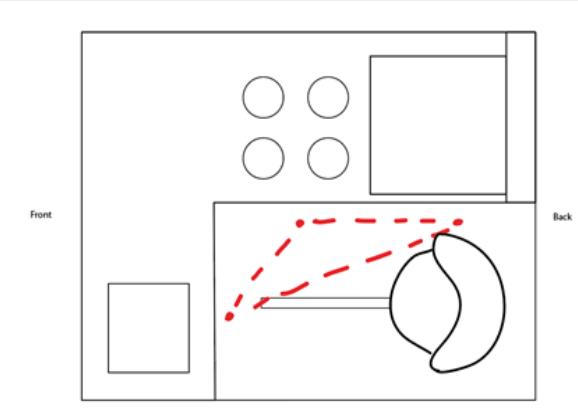

Image 14 - First interior layout

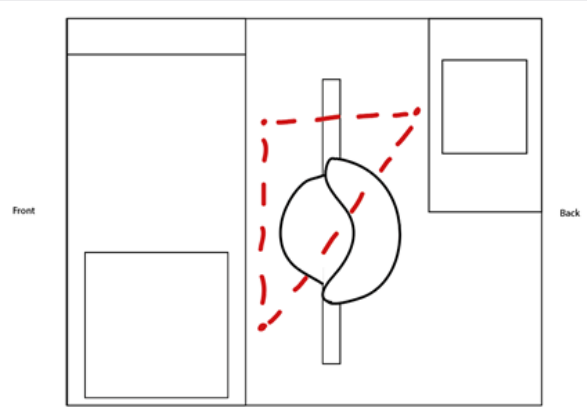

Image 15 - Second interior layout

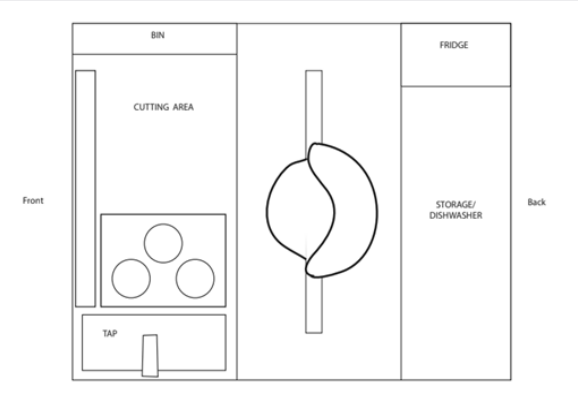

Image 16 - Third interior layout

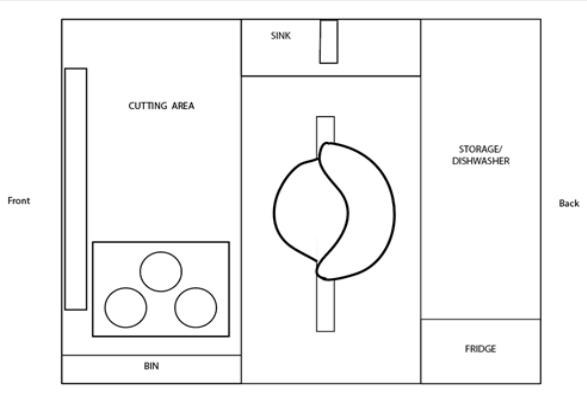

Image 17 - Final interior layout

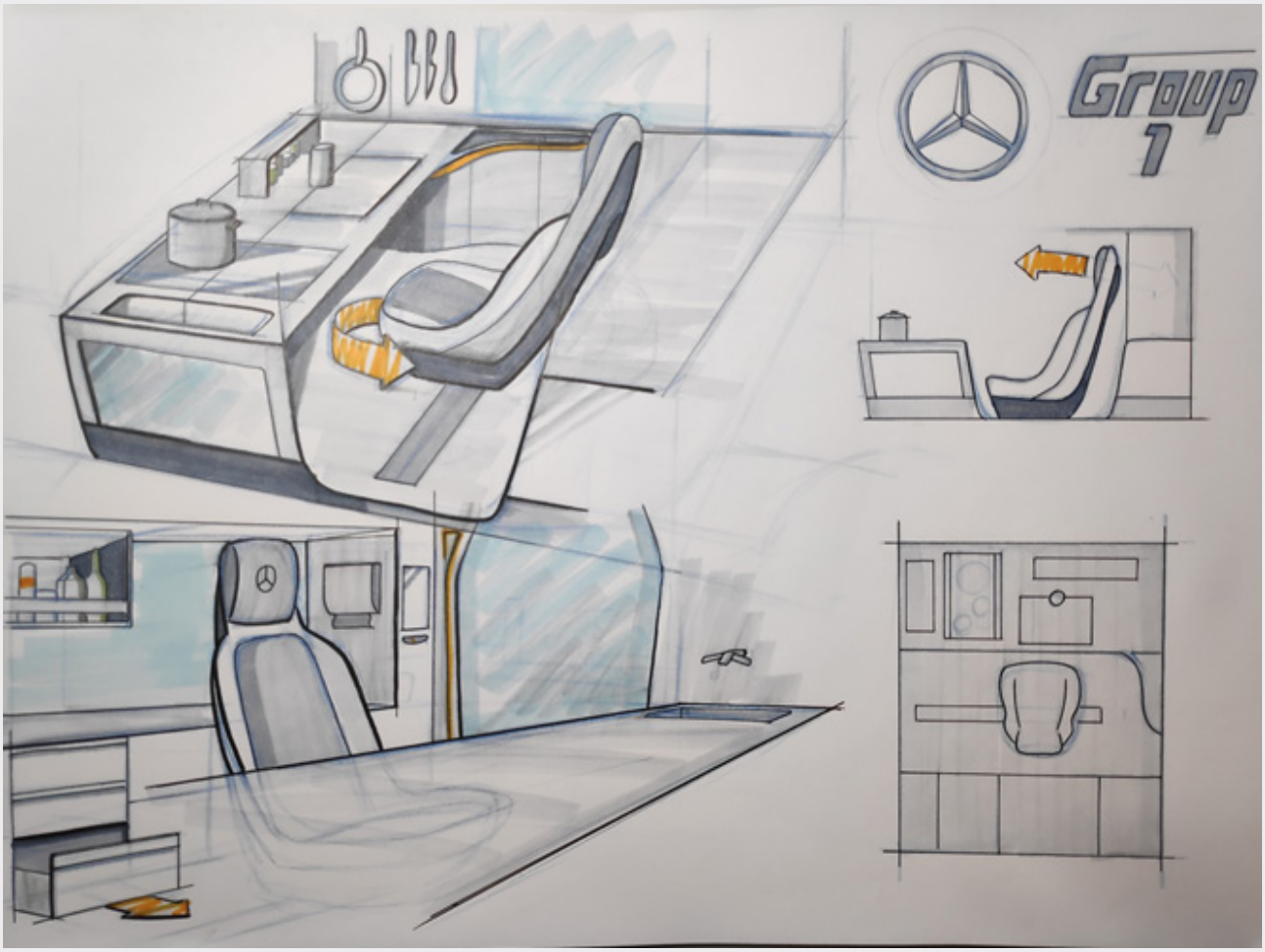

Image 18 - Interior concept sketch

Business plan

From the very beginning of the project, the group was aiming to design for the car sharing ecosystem. This influences several design requirements like sustainability and personalization, but most of all it influences how the concept would be introduced to the market. Car sharing is mostly done in two ways: sharing a car that is owned by an individual, or sharing a car that is owned by a car sharing company. The interior of Mobico, however is very task-specific, so the latter is the most suitable since it would make little sense for most individuals to own such a vehicle.

With the given requirements of 2,00m x 1,60m x 1,20m, the team decided the space could best be occupied by one person. Therefore, the concept would mostly be used as a solution to time shortage or just plain convenience. We think this kind of concept is best released into the market using a rapid market penetration strategy, where the concept would be mass-advertised and widely available to a large public at a relatively low price. This sets a low threshold for end users to try the product and spread the word.

Since this concept and marketing is very different from Daimler's Mercedes brand, which is considered as an expensive high-end brand, it would make sense to market this concept by a different name to again, contribute to a low threshold.

Finally, it would make sense to start several strategic alliances with companies like Hello Fresh. This would allow both companies to use each other's resources, networks and marketing channels, saving both money and effort. At the same time, the new Mobico concept would be associated with a large well-known brand, which would increase the chance of a successful market introduction.
If the given requirements would be a bit larger, say 2,00m x 1,80m x 1,20m, the team would be able to fit two people into the same vehicle, offering the mobile cooking process not only as a convenience, but also as a social process. In this case, the car could be used as a part of a city trip for example, visiting local markets to gather food for cooking in the car. The car would serve as a fun activity instead of a convenience.

This changes the way the concept could be introduced into the market. In this case, a slow market penetration strategy would fit better, starting with low availability and a relatively high price point, but with high marketing. This creates a sort of "limited edition" product with high demand and low availability. Overtime, this popularity will allow for a growth in availability to reach a larger public. Finally, the concept could be introduced under the Mercedes brand as it follows the high-end brand identity.

Overall results

To describe the final outcome of the project and its functionalities, it can be divided into two major parts: The cooking pot prototype and the cutting mechanism. Each part had its own design process and underwent changes while working on them from beginning to end.

The cooking pot prototype is the representation of how a cooking pot could look like within a level 5 autonomous vehicle in the future. Although it looks like a regular cooking pot, it has some important features that define its functionality in the car. First of all, the device has a dedicated locking system to keep it in place while driving. Secondly, the lid has an incorporated locking system that makes sure it can not be removed during the cooking process. Finally the cooking pot has 2 features for user input and feedback. The handles are equipped with vibration feedback, telling the user not to pick up the device during cooking. The device also features a light ring around the bottom which indicates the different stages of the cooking process. All of these features combined ensure a safe and seamless interaction with the device that is suited for use in a moving vehicle.

Secondly the group came up with an safe cutting mechanism. This system can be used for cutting all sorts of products in a safe and user-friendly way. Different knives can be placed and used in a smooth motion. As this system can rotate via a magnet at the bottom, both left and right handed users will have no problems with cutting. Another function of the magnet is that it allows the device to disassemble and be stored in a separated cabinet, creating extra room on the counter top to perform different tasks.

To let the project come together as one body, a special house style was created to create a coherent and recognizable look. So instead of showing two separate prototypes, this ensured the project was seen as a whole. Mobico explored the possibilities of how car interiors in the future of mobility could look like and realized those to form a well constructed representation.

Image 19 - Demo Day setup

Conclusion

Clearly, within the timespan of this project, it would not be possible to build a complete car interior. Therefore, the group chose to build two main elements from the kitchen. These prototypes and the overall interior design are built and designed with the projects pre-set requirements of comfort, safety and sustainability in mind. They have dedicated features related to those requirements. They therefore meet all the requirements, except for the Mercedes design style, since it was quite difficult and expensive to get very high end materials and production methods.

Although there is always a possibility to improve the concept, the group feels that the overall goal of the project is met. Project Mobico has proven that it is in fact possible to utilize the car interior for very unusual purposes and has been a very unusual and creative exploration of those purposes.

Overall, the group considers the project to be a success, not only in relation to its goals, but also with a satisfied client that was very enthusiastic throughout the process. A huge compliment!

Discussion

Overall, it is fair to say project Mobico was a success. The group received a lot positive feedback at the Demoday from the public, but also from the coach and client. With the final setup that was delivered, the team reached the project goal of discovering new possibilities and proving the car interior is capable of much more.

Apart from the project goal however, the group feels that the concept itself could be improved. To start with the cutting concept, which requires a quite specific movement, could be improved by analyzing the natural cutting motion with multiple different foods. Based on this data, the cutting device could be more refined and mimic a more natural movement. Next to that, the storage of the device and the knives could be reconsidered since in the current design, the knife has to be removed from the device to switch knives.

For the pan prototype, the group mostly focused on cooking water. In some dishes however, you are required to cook more than just water, which sometimes requires to add ingredients during cooking. With the current fixed lid design, however this is not possible. Therefore, a "two-lid" compartment could be added to the lid, which opens the lids separately to add ingredients.

Of course, there are many more features and functions that could be added to improve the design, but on a more general note, if Daimler were to continue this concept, safety is an aspect that definitely needs more attention. In particular, implementing airbags will be a major challenge.

Although the group is very happy with the results of this project, the process behind it was not as smooth as usual. It is fair to say there were quite some issues regarding the functioning of the group. The first issue the group ran into, was the fear of making decisions. Many and many ideas were looked at, but at the first setback or negative feedback, the idea was abandoned. This behavior was especially present in the beginning of the project. It took some time, but eventually the group managed to reflect and fix this issue.

Immediately after the project started, it became clear the group members had very different goals and visions for the project. This resulted in a rough start of the ideation phase, where the group mainly focused on what could not be achieved. This, instead of finding each other's qualities and similarities, caused a significant delay in the process. After a reflecting session and meeting with the client, the group managed to solve this problem and introduce a very positive vibe. This gave the project a significant boost that got the group back on track.

Finally, the communication within the group was not strong. All group members contributed to this, but two members started to act like one person when the group was split up to work on different prototypes. This resulted in "communicated" decisions, but only within that part of the group. Although this did not cause any significant problems for the process, it did cause some unnecessary irritations and minor delays that could have been prevented.

Although this project did not go exactly as planned, the group learned a lot from this process and all problems were eventually fixed. The difficulties within the group might seem like a bad thing, but they bring a lot of new experiences that are valuable for future group work and collaborations. And as can be seen from the project's outcome, an unusual process is not always a bad one. In the end, the group feels positive about the project and outcome and is convinced that its goals are reached.

Image 20 - Demo Day setup

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Individual reflections

Reflection Bart Bongers

In this reflection I will talk about the design process, collaboration and organization of the group and how they play a part in the integration of my goals. Throughout the project "Smart Mobility" I learned a lot of different things, not necessarily the things I had in mind but very important aspects of design. At the start of my second bachelor year I set myself a couple of goals.

First of all I wanted to improve my pitching skills. I set this goal because I wanted to improve my teamwork and communication skill. To achieve this goal I needed to do a lot of practicing, so I did. Throughout the project I pitched our ideas and products multiple times. With as highlight the pitch for our client "Daimler AG". After a while I felt more comfortable doing it as I became less nervous, this resulted in a clearer presentation. Although I improved, I want to continue practicing in upcoming courses.
Secondly for the creativity and aesthetics competence I desired to take my sketches to a professional level. During this project I was responsible for the sketches. By practicing drawing with my drawing pad and implementing my skills learned from parallel on-going "exploratory sketching" course, I significantly improved. I base this on the positive feedback of the "overview sketch" displayed at the final Demoday. But I think I can improve on the communicative side of sketching, meaning that you could "sell" your product to a client via a sketch.

Finally and the most important learning point of this project was how to handle difficult situations with your group. Especially in the first quartile of this project we had difficulties with proceeding with the process. We had a very long ideation phase as we did not make any decisions. We all had our own opinions and they collided sometimes. Instead of promoting our own ideas we should have listened more to each other including myself. If you communicate and reflect on the ideas of others you can achieve way more in less time, and we saw that in the second quartile. First of all I was appointed as group leader, so that I could keep a helicopter view of the situation. This was also a learning experience for me on the organizing front. Sometimes there was still a bit of friction between team members. I learned how you should and should not handle in a situation like this. For example during the meeting, I as a chairman should intervene quicker to let everyone speak. Examples like this and reflecting afterwards contributed in getting more experience in the teamwork and communication skill. In the second quartile the organization bettered significantly. Instead of two meetings a week we went to three meetings, we arranged clearly what we expected from each other. Everyone did what he/she should do, and if there was a problem the group was always available to talk.

Overall I am satisfied with the design of Mobico and with my personal improvement. Next to the goals mentioned above I additionally contributed in other competency areas. Like in the technology and realization area I focused on building prototypes. With the business and entrepreneurship area I investigated brand identities and talked to experts. I contributed in the user and society area by doing user tests. Unfortunately I did not develop the math, data and computing area. My personal improvement combined with my achieved goals results in a positive experience filled project.

Reflection Inge Hootsmans
This reflection is going to be about my experiences with the project "Smart Mobility" DBB100. It will go on about the research process, design, integration of competency areas, collaboration, organization and planning.

Starting with the research process, the process was different from what I expected it to be. This was partly because we had a very long ideation phase in which we did research in various concepts. Looking back, it was a big learning moment for me. I now know that I prefer to choose one concept from early on and do more exploring into this idea, than exploring into a lot of different ideas and then choose one. However, I have to acknowledge that, having a long ideation phase did give us a good reasoning behind why we went on with the kitchen in the car concept. Furthermore, for this project we had a client, Daimler AG, and were given a challenge. I had never worked with a client before and first thought they would be restricting on what they wanted from us. This was not the case, they were very open-minded and liked the 'crazy' ideas, which I thought was nice since it did not limit the ideation or design process.

Since Mobico exists out of different concepts, it was decided the team split up to work in teams of two on a specific concept. I liked this, since now more work could be done and not everything needed to be discussed with the team. We did held regular meetings to keep everyone updated, which was good since important design decisions were still made with the whole team. The design decisions were based on the talk we had with experts, prototyping, trying and user tests.

When looking at the integration of competency areas, I think I have developed myself in most of them, while doing this project. Within creativity and aesthetics; I built different prototypes and looked at the Demo Day set-up. In user and society I focused on making user tests, taking them and talking to different experts. Talking to experts was also helpful for developing myself in the business and entrepreneurship area, however within this project the focus was not really in this area. Building prototypes also helped with the technology and realization area. Lastly, math, data and computing is an area I have not developed in, within this project.

Collaboration-wise, I think communication is key to having good teamwork. In the beginning the teamwork and communication in the team was not very good. Everyone had different expectations when starting this project, which led to the team not working together. However, after having a good conversation about this, the teamwork and communication improved and helped us create a good end product.

Within the organization there could have been some improvements. At first, I tried to keep everything organized, but with the long ideation I found it hard to keep it that way. An improvement within the organization was when we decided to have another meeting in the week, besides the two planned meetings. We were able to discuss more and get more work done. Once everyone had their own role within the team, the organization became a lot better.

It was decided that I would keep the planning within the team, since I like to keep things organized. I think the planning was well kept, however sometimes not all tasks where achieved. Two months before the Demoday, I decided to make a long-term planning and made sure we would have some buffers. I think this helped us a lot with getting everything done in time.

Overall, what I will take with me in future projects is that I should always strive for good communication and organization within a team. Next to that, make a lot of prototypes and try them out, talk to different experts and ask other people (users) for feedback.

Reflection Levy van Kempen
The following reflection will describe the personal growth and development of myself during the design process of project 2 within the squad 'Smart Mobility'. Whilst the project was continuing, I had set a couple of goals on beforehand that I wanted to accomplish in the duration of the design process.

Working together with Daimler AG during the project was great. Having a real client with a rich background motivated me to deliver an excellent product at the end. Having feedback sessions with them helped in guiding in which direction the project needed to be headed. Guidance was really needed in the project since the group, including myself, at certain times chose the 'wrong' direction which costed much time. Although wrong at the time, in the end it became a major learning point that I now know how to prevent in upcoming design projects.

Goals set previous of the start of the project were linked to competencies. While I had set goals for every competency in project 1 and taking a shot at accomplishing all, in project 2 I wanted to keep focus on precise goals that were definite and clear-cut. The goals set were: Improve prototyping, become better in report making and incorporate the user in the project. Quickly applying various prototyping techniques for prototypes that are designed for specific real users is what I want to learn during the study.

To improve prototyping, I explored different materials and made prototypes out of them. Having worked with wood before I knew what was possible with it and what not. For this reason, I wanted to see if different materials could be used better in certain situations compared to wood. What I learned from this is that PVC is widely available in different difficult to form shapes, therefore perfectly suited for the prototype I was making in the project. Moreover, I tried different prototyping techniques and used them in the project. Having followed a SolidWorks workshop, I could model basic structures and 3D print them. I learned that this type of technique is very versatile since structures can be made that are not possible with e.g. wood. At last, I became more familiar with laser cutting. I learned from this that it is an easy and fast way of prototyping that eventually also was used in the final prototype. (Creativity and Aesthetics, Technology and Realization)

The goal of becoming better at report making was by using InDesign for the projects report and asking experienced people where to focus on in a report. As I had not made anything in InDesign before, it was necessary to just try things in the program in a trial and error manner and look what worked and what not. When asking experienced people on what to focus on it became clear to me that a report should be consistent, which could be created by using a house style. I learned that using one specific color set and font in the entire report already made a huge improvement. (Technology and Realization)

Achieving the last goal would be accomplished by having close contact with the user. The reason I want to work in close contact with the user is because I want to design for the real user and not who I think the user is. The project I was working with had, besides the eventual target user, no real user at this time thus being in contact with experts in the field rather than specific users. For this reason, I sought contact with various people in different areas of expertise. Expert interviews were conducted ranging from product trainers to kitchen interior experts. I learned that talking to experts and conducting small user tests would give different perspectives on the same project than I had. Because of this, feedback received from these people could be implemented in the project and therefore improve it. This feedback consisted both of designing choices and the feasibility of the project looking at in from a market-based perspective. (Business and Entrepreneurship, User and Society)

Commenting on how I want to improve myself in future design projects starts with choosing an idea. Since I was really looking for the best idea out there in the beginning, prototyping started rather late in the project. Instead of postponing choosing an idea, start earlier on and tinker with prototypes. In this way, new ideas can develop from making certain choices during prototyping that can be easily altered and change the direction the project is going instead of keeping on discussing what topic to start on.

In addition, communication wise in this project it was not great. Clearly stating from each other what is expected helps preventing misunderstandings. Doing this in the start of the project next time will help to know clearly from each other what one can expect and what not.

Concluding, the experience I got out of this project was eventually surprising positive. Although at the beginning I was not very pleased with the direction and communication within the project, at the end these problems were solved, and I became motivated to finish the project and be proud of its result.

Reflection Mathias Verheijden
Project Mobico was one of the most important experiences during my study so far. Filled with fun and exciting moments, but also many difficulties and struggles, I have not only grown in the competency areas, but also in my professional skills.

It was nice to work for a real client, Daimler AG, within the project. Although I expected some more interaction than just two skype meetings, the feedback was very positive and helpful, which vastly improved my motivation. The project requirements offered a lot of freedom, which resulted in a 'market first': cooking in a car. This forced to perform a lot of research, instead of finding existing research. Because of this, I learned several new research methods and I am able to better understand users and markets. These are useful skills that I can use for my future work.

Although I find that I developed myself in all competency areas, my focus within this project was mostly aimed towards three. First of all, within the creativity and aesthetics competency, I did a lot of sketching in line with my professional development plan. As mentioned there, "In group projects, I will try to do more sketching assignments to practice this skill", which went pretty well. Still, I am far from making professional sketches, but I am able to communicate my ideas and illustrate what I mean, which was a good first goal to aim at. I am planning to further improve this by following sketching courses as mentioned in my PDP.

For the technology and realization and math, data and computing competencies, I focused on my physical and digital prototyping skills in line with my personal development plan. On the physical side, I taught myself how to better work with several tools in the Vertigo workshop. By learning these tools, getting familiar with new materials and combining these two, I am now able to create more complex shapes and better realize my designs. This gives me a lot of freedom in my designs, solving my original problem mentioned in my PDP where "I often have trouble with turning my ideas into a physical object. This has to do with my basic form-giving skills, but also with the electronics side of prototyping".

The latter was also one of my main priorities within the project. By being responsible for pretty much all electronics and programming, I forced myself to dive into the unknown and learn by research and trial and error. My wiring skills hugely improved and I now understand much more components and circuits overall. To actually use the components, I invested quite some time in learning programming. I'm very happy with the results I have been able to achieve. I've gotten much better at creating the user interaction I have in mind, which has always been a bit of a struggle.

Apart from the competency areas, this project also significantly contributed to the development of my professional skills and my experience in projects overall. The first thing I noticed right away, is that freedom within a project is not always a positive thing. Although, it allows for many options, it makes it harder to actually choose something, which brings me to the next point. Throughout the project, I started to notice that I (and the group) was very sensitive to negative feedback, which often resulted in abandoning the current idea. I learned that negative feedback should be taken into account, instead of immediately taken as a guideline. This realization will save me lots of time in my next projects and make me 'own my own project'. On a personal note, I learned to see and focus on possibilities instead of constraints.

If I have to name one point of improvement for this project, it would be communication. The group just started working on the project, instead of setting goals and expectations. This resulted in several unclear situations and uncertainties that could have easily been prevented. By creating a clear structure for a project and looking as far ahead as possible right from the beginning, it is easier to create a strong foundation for all iterations that follow. These goals and expectations are not only relevant regarding the project itself. As our process has shown me, it is even more important to set goals and expectations for each other, as group members. For future projects, I want to take the initiative for this, as is clarifies how the group can count on each other and prevent annoyances based on false expectations.

Overall, I find that this project has been very valuable for me in my development as designer. Not only have I gained skills in the competency areas, but mostly in my professional skills. Although I was not satisfied with this project in the beginning, I managed to find my drive and motivation again. In the end, I am very happy with the outcome and the experience I gained from this project.

Appendix

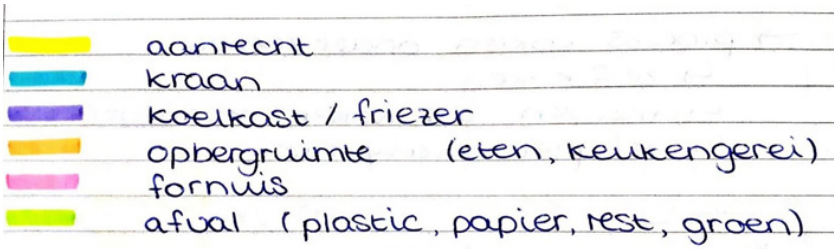
Please note that this appendix is bilangual.

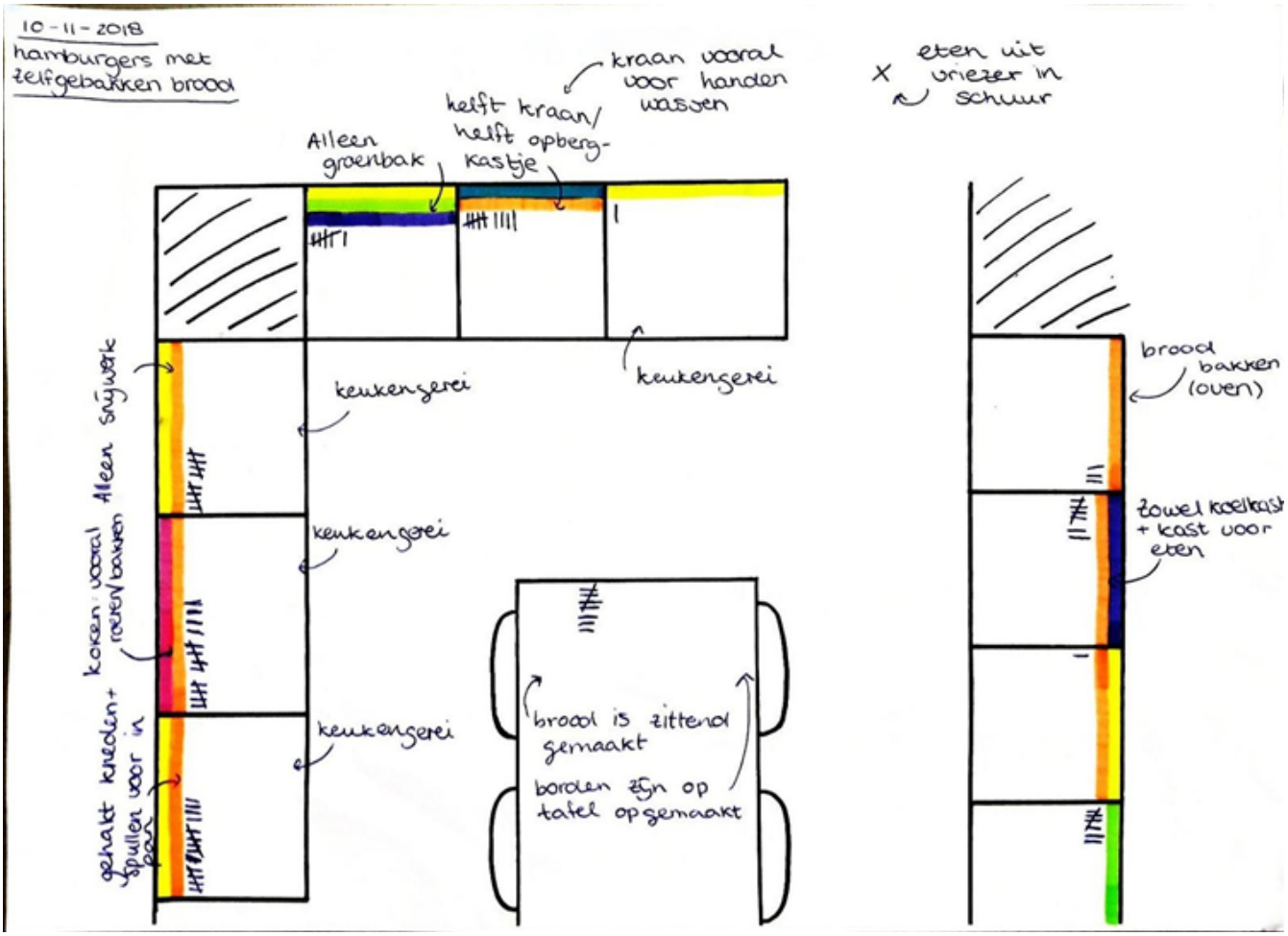
1 - Analyses results cooking process observations

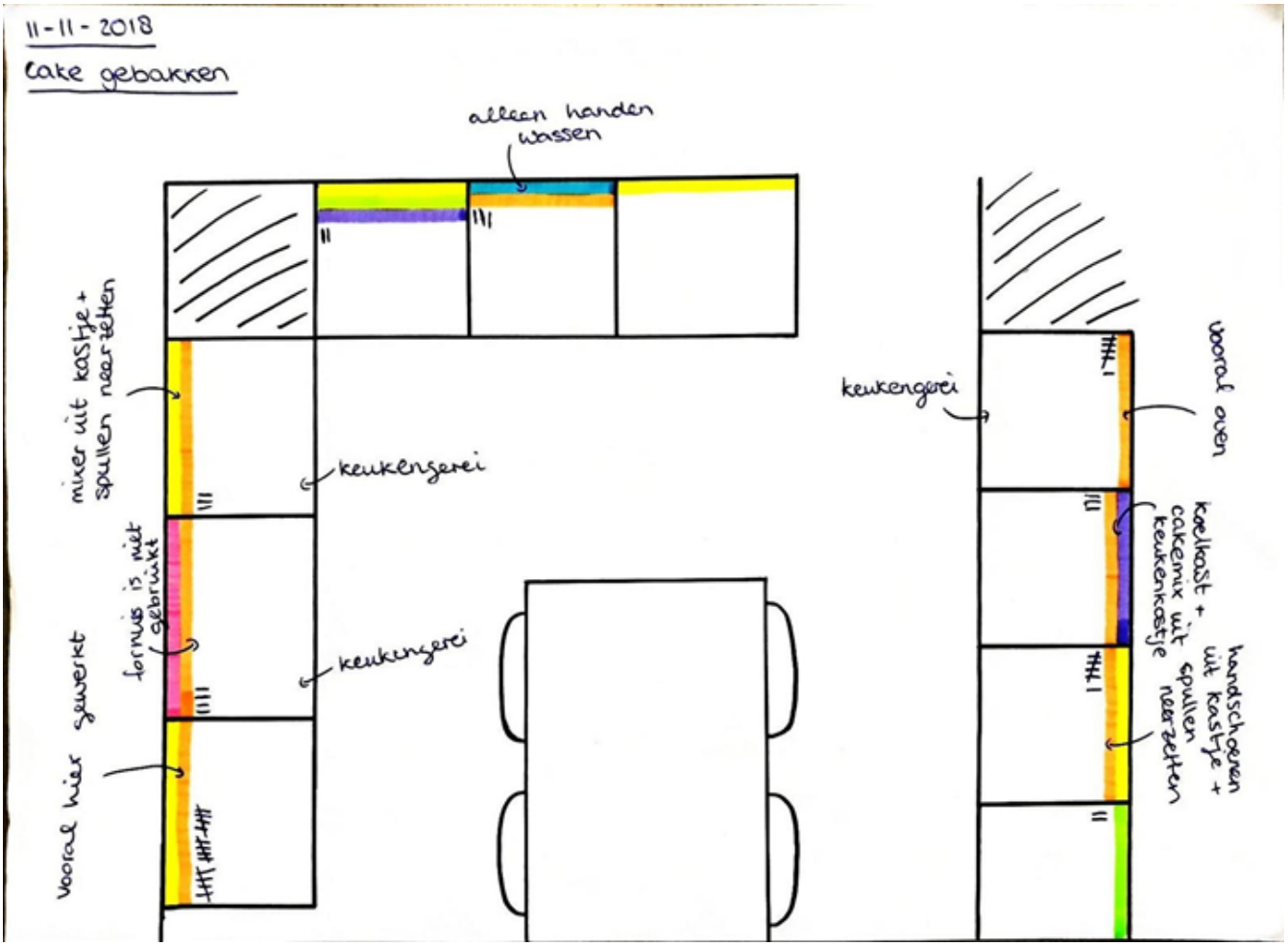
From the observations (can be found below) several conclusions were made. The places where people are most in a kitchen are the stove, where they cook, and the litter bins (waste is separated). Also the observed people had a specific place where they cut their food, this was different per observed person. A striking insight is that the observed people mostly used the water tap for washing their hands. From the observations it could also be seen that in different kitchens, there is a working triangle (Kohler Co., 2018) with the three most important places in a kitchen; the stove, fridge and water tap.

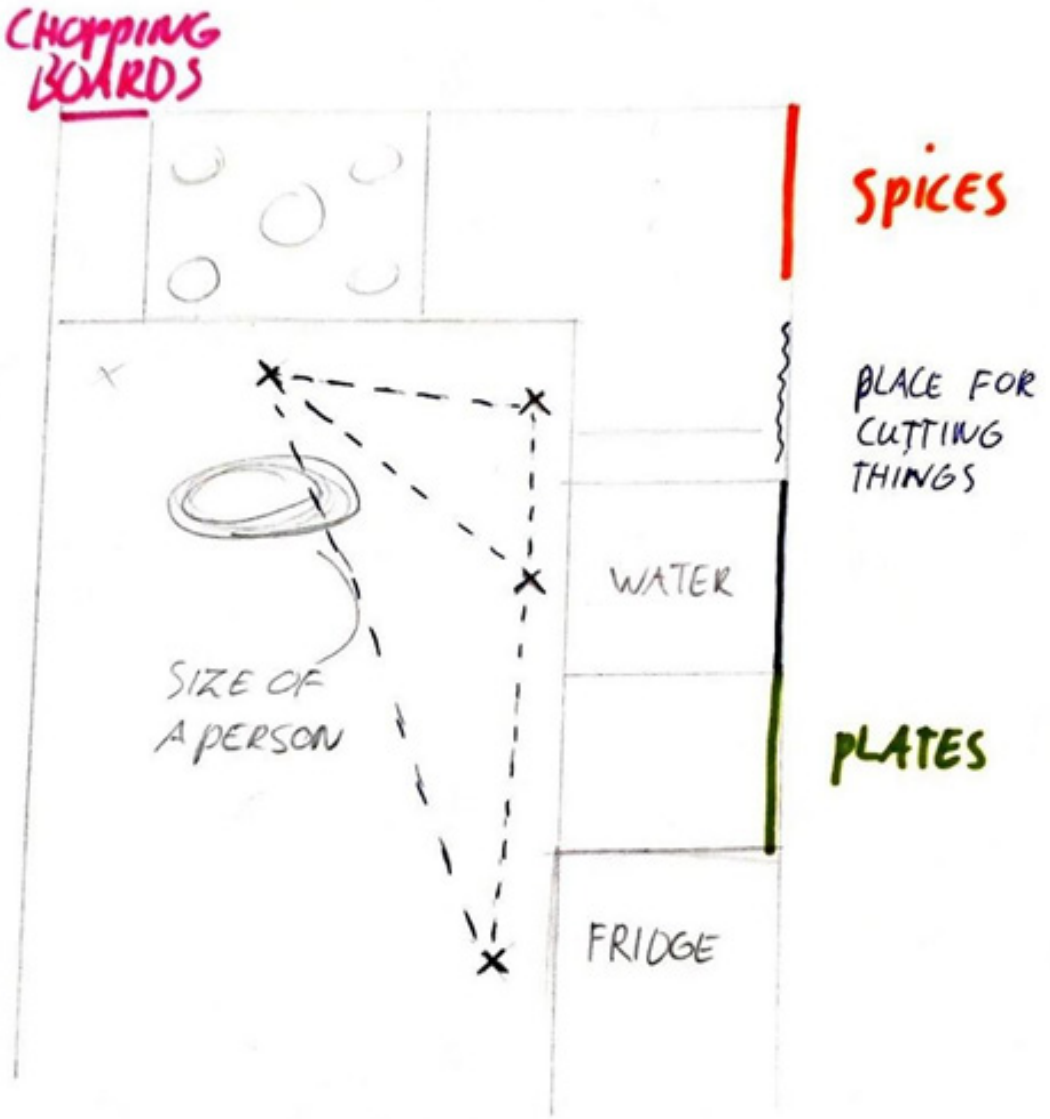
1.1 Observations cooking process

Locations of kitchen tools and how many times they are used.




10-11-2018
hamburgers met zelfgebakken brood
kraan vooral voor handen wassen
helft kraan/ helft opberg-kastje
Alleen groenbak
eten uit vriezer in schuur
keukengerei
keukengerei
keukengerei
keukengerei
Alleen snijwerk
koken vooral roeren/bakken
gehakt kneden+ spullen voor in
broodbakken (oven)
zowel koelkast + kast voor eten
brood is zittend gemaakt
borden zijn op tafel opgemaakt


11-11-2018
cake gebakken
alleen handen wassen
mixer uit kastje + spullen neerzetten
keukengerei
keukengerei
keukengerei
vooral hier gewerkt
formuis is niet gebruikt
vooral oven
koelkast + cakemix uit keukenkastje
handschoenen uit kastje + spullen neerzetten



2 - Analyses necessary kitchen tools
From the questionnaires on kitchen tools (can be found below) several conclusions were made. For cutting something that is noticeable is that all interviewees have a preference for which knife/knives they want to use. Meaning that there should be a variation of different types of knives, from the questionnaires the most commonly used knives are a chef's knife, a peeler and a small sharp knife.

Other knives mentioned were a cartel knife and a bread knife. For cooking the interviewees almost all use different types of pans, the type of pan used depends on the meal cooked. The most common pans are baking pans and pans with a lid for cooking vegetables and pasta. Other pans which were mentioned were a wok pan, grill pan, casserole and a saucepan. Whilst cooking in pans the interviewees used the following kitchen tools; spatulas, ladles, cutlery (spoon, fork) and serving spoons. Lastly other kitchen necessities according to the interviewees are a cutting board, paper cloth/towel, colander, bowls, mixer and storage trays.

2.1 Questionnaires / interviews on kitchen tools

Interview 1
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
I prefer a paring knife, but most of the time I use a small and sharp knife. I don't like using big knives.

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Iron stir frying pan, and a normal cooking pan with a lit. Sometimes I use a standard frying pan

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
Wooden spatula.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Cutting board and a boiler.

Interview 2
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
I use one sharp knife for everything, because it lower the amount of dishwash. But if I need a specific knife (breadknife e.g) I use that of course

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
A big frying pan to cook pasta or vegetables.

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
A spatula or a ladle, depends on the pan.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
I use small spoons to collect spices from little jars, possibly bowls to place the food.

Interview 3
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
Paring knife and a big knife.

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Stir frying pan or a normal frying pan.

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
Wooden or plastic spatula.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Lid of a pan and a strainer

Interview 4
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
A cooks knife

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Frying pan and a stir frying pan

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
A spatula.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Bowls for the lettuce, by exception a mixer, cutting board, storage boxes and a measuring cup.

Interview 5
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
We don't really bother, but most of the times a big bread knife.

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
A big frying pan, because we stir fry a lot of vegetables. A frying pan is also used and we have normal cooking pans in multiple sizes.

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
The whole kitchen is filled with two persons to cut the products(cutting board). For the cooking itself we use wooden spatulas.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Spices are very important at home. Next to that cutting boards as mentioned before. We always put on music to create a nice atmosphere.

Interview 6
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
For vegetables I use a big knife, and for more precise jobs I use a paring knife.

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Een kleine koekenpan en een steelpan of een grote koekenpan.

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
A scissor and a ladle.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Cutting board.

Interview 7
What tools are used in the kitchen:
Knives
- Big knife
- Serrated knife
- Paring knife

Pans
- Frying pan
- Normal pan
- Grillpan

Other
- Wooden spoon
- Plastic/iron spatula
- Fork
- Spoon (large and small)
- Cutting board
- Strainer
- Towel
- Paper
- Weighing unit
- Storage boxes

Interview 8
What tools are used in the kitchen:
Knives
- Serrated knife
- Knife for fruits

Pans
- Frying pan
- Cooking pan

Other
- Wooden spoon/spatula
- Plastic spatula
- Fork
- Cutting boards
- Towels
- Paper

Interview 9
What tools are used in the kitchen:
Knives
- Big knife
- Paring knife
- Sharp knife for meat

Pans
- Frying pan
- Stainless steel pan

Other
- Wooden spoon
- Plastic/Metal spatula
- Fork
- Cutting board
- Strainer
- Towel
- Paper
- Weighing unit
- Storage boxes
- Measuring cup
- Qooker

Interview 10
What tools are used in the kitchen:
knives
- Big knife
- Paring knife

Pans
- Frying pan
- Cooking pan

Other
- wooden/plastic spoon
- Cutting board
- paper

Interview 11
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
Depends on what I'm going to prepare, for potatoes a paring knife, meat knife for meat and a big knife for vegetables, serrated knife for tomatoes

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Frying pan

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
Wooden ladles, fork and spatulas and a whisk.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Multiple cutting boards, strainer, a mixer and diverse plates. Next to that a measuring cup

Interview 12
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
Cooks knife and a paring knife

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Frying pan

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
Ladle, spatula

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Cutting board and a strainer

Interview 13 (restaurant owner)
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
We use "Global" knives (brand) very expensive but fine to use.

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Whisks, strainers and much more

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
Stainless steel pans.

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
blender , vacuum machine

Interview 14
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
Standard knife, paring knife

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Frying pan, stir frying pan

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
Spatula, wooden spoon

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
The microwave and a boiler

Interview 15
1. Cutting: What kind of knife/knives do you use on a regular basis when cooking dinner? (Wat voor soort mes/messen gebruikt u meestal tijdens het koken?)
Normal set of knives, mostly use serrated knife.

2. Cooking: What pans do you use mostly when cooking dinner? (Wat voor pannen gebruikt u het meest tijdens het koken?)
Spoons, spatula, ladle

3. Cooking: Do you use any other kitchen tools whilst cooking in pans? (Gebruikt u andere keukengerei tijdens het koken in pannen?)
Stir frying pan, for meat a normal pan and for vegetables a grillpan

4. Other: Are there other kitchen tools you prefer to use whilst cooking? (Zijn er andere keukenbenodigdheden die u graag gebruikt tijdens het koken?)
Cutting board, strainer, mixer

2.2 Research on essential kitchen tools
Essential kitchen tools (Real Simple, n.d.)
Spoons, ladles, and more:
- Ladle
- Locking tongs
- Metal spatula
- Rubber spatula
- Slotted spoon
- Whisk

Slicing:
- Chef's knife
- Garlic press
- Grater
- Kitchen shears

- Lemon press
- Microplane grater
- Paring knife
- Potato masher
- Serrated bread knife
- Y-shaped vegetable peeler

Other equipment:
- Can opener
- Corkscrew
- Instant-read thermometer
- Measuring cups
- Measuring spoons
- Peppermill
- Salad spinner
- Timer
- Wire mesh colanders

25 essential kitchen tools (The Daily Meal Staff, 2018)
- Wooden spoon
- Off-set spatula
- Rubber spatula
- Tongs
- Whisk
- Rolling pin
- Food processor
- Stand mixer
- Scale
- Sauté pan
- Cast-iron skillet
- Stock pot
- Colander
- Dutch oven
- Metal baking pan
- Nesting set
- Cutting board
- Measuring cups
- Measuring spoons
- Chef's knife
- Paring knife
- Bread knife
- Y-shaped vegetable peeler
- Kitchen shears
- Honing steel

Remarks
- Scale can be inside the table: than no measuring tools/scales are needed
- Timer could also be inside the table
- A cutting board is not needed when the table can handle it (à table does need to be cleaned when this is the case; automatically after use à a wipe will go over the table?)
- Which pans are mostly needed (for example at home; there are several pans which are used the most)
- Maybe some kind of notification when ordering the car that special tools which would be needed are not available? (then a recipe should be chosen when ordering the car)

- Lemon press
- Microplane grater
- Paring knife
- Potato masher
- Serrated bread knife
- Y-shaped vegetable peeler

Other equipment:
- Can opener
- Corkscrew
- Instant-read thermometer
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3 - First meeting with Daimler
Daimler explains that cooking is an interesting subject, as this brings a lot of challenges with it. They see this concept in a range of cars, all with its own functionality and target group. Daimler expressed the quality of a Mercedes interior, other manufacturers are not on the same level. Where would this go in the future? Well, Mercedes will continue to lead in the luxury and comfort area. The new technology from Mercedes will first be implemented in the more expensive cars, afterwards when it is more developed and becomes cheaper you can choose it in the whole fleet of cars. The focus of a car interior is always based on the driver, but when there is no steering wheel the focus is spread over all seats. On average a Mercedes is occupied by one or two person(s). But this number may change in the future, as car sharing is becoming bigger and bigger, time will tell. Will luxurious cars also be shared? "The car will be shared but is used privately" so that the customer is not distracted from another user.

4 - Meeting inspiratiehuis 20|20
The meeting with Karin Bos, …, was very informative. She told about the connections between all devices in the kitchen, which makes all the devices working à Sync. The devices will start at the right time so that everything is cooked at the same time. Also ovens were mentioned, they are becoming more than a "combi-oven". They are now full-featured ovens, without sacrificing features or quality. The ovens also have a cleaning system, there is a ecoclean oven, regeneration of material, and pyrolyse cleaning, heat. Next to the full-featured ovens, cooking is also becoming automated. With cook and roast sensors, pre-programmed meals are easy to prepare. Karin also gave options for cooking in a small space, features as slide and hide exist for ovens, where the oven-door slides in the cabinet and it does not take up any space. Also domino cooking stoves exists. Karin was able to tell the upcoming trends in the kitchen. She told that healthy eating and thinking about the environment is becoming a big thing. Next to that she thinks people want more high quality foods and vacuum foods. She said that kitchen devices will be adjusted to certain recipes, which would be a good solution since she says that thinking of what to cook is a major issue for people. Lastly, Karin also told that artificial intelligence is becoming a big part of not only kitchens, but the whole household.

5 - Meeting keukendepot Eindhoven
Knowing the layout of a 'standard' kitchen and the ins and outs of regular kitchen necessities were helpful for developing the ultimate layout of the project. Keukendepot Eindhoven helped us in giving information during an interview. In this interview the layout of traditional kitchens were explained which resulted in the answer that every kitchen is different and based around the users needs. If the user would want something in a specific order, the kitchen company would make it in that order since the 'user is king'. Next to that, keukendepot Eindhoven explained that if there would be a regular kitchen layout, it would not have a cooking plate and sink next to each other because of safety (water could spill on the heated elements and flames could occur). Looking at the designed layout this was not implemented since the design uses induction heat and water supply and drainage from the bottom. At last, keukendepot Eindhoven gave a insight in upcoming colour palettes used in kitchens.

6 - User test knife observations and feedback
Observations: Users did know how to deal with the prototype. They got the hang of it after a few tries. Overall they were positive.

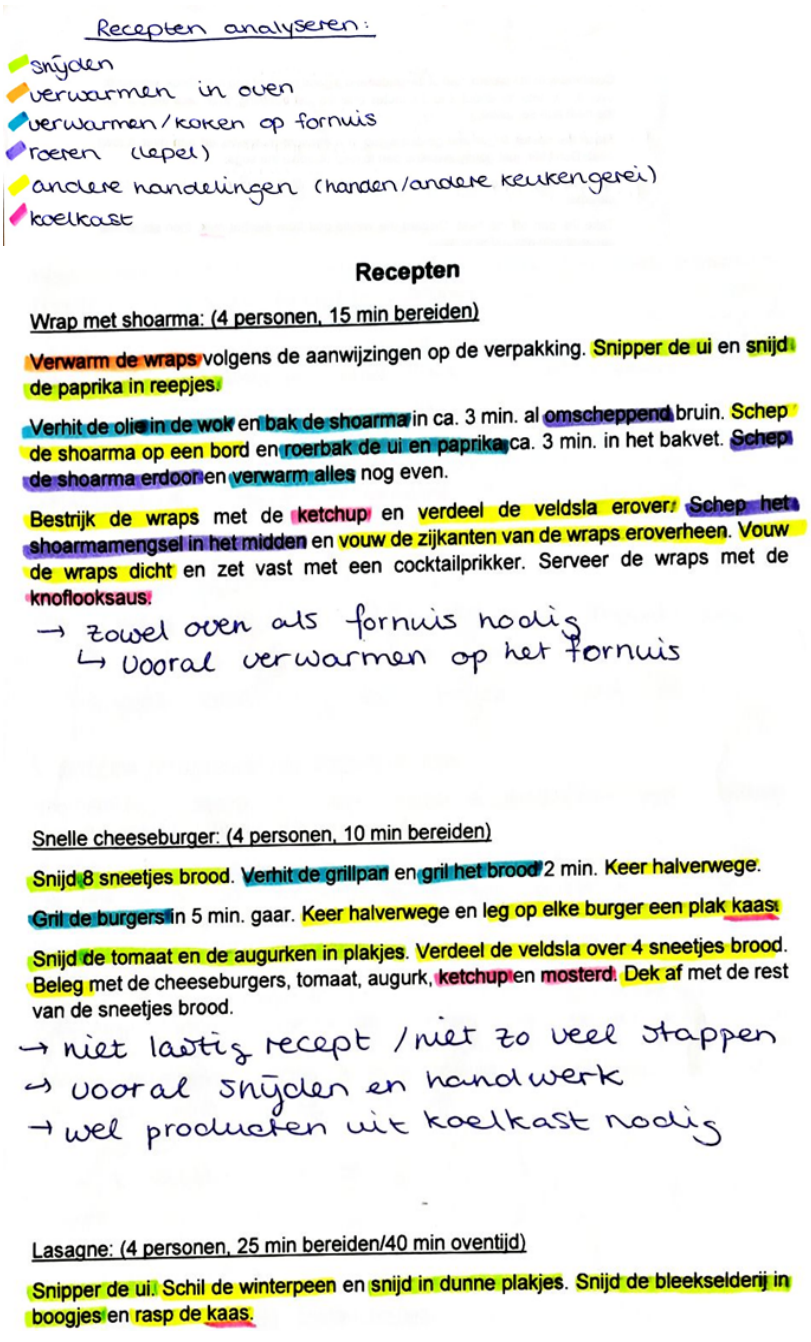
Feedback:
P1: cutting motion underneath does not go smooth, more space is needed
P2: motion has to be smoother
P3: a bigger knife would help
P4: it goes quite smooth, it is a natural motion, fingers are stuck in between. Cutting area could be a bit lower in respect to the prototype. Cutting motion underneath goes rough. Without the cutting area the knife does not cut through the whole product
P5: little bit rough, lid for safety is respected, the knife goes out of the casing
P6: sanded material is nice to touch, the stabilization of the product could be better

7 - Second meeting with Daimler

Daimler was pleasantly surprised to see the group had continued with the cooking project since it was a big challenge. Ideas and concepts of the group that were developed during the project were shown and explained with a brief demonstration of the locking system and the knife cutting mechanism. Positive feedback from Daimler was received and suggestions of their side were giving such as: make cooking in the car not only an efficient means but also as a fun 'trip'. Go to a city that the user wanted to explore and let them ride along cultural highlights and local markets for the ingredients. This would give the project an extra dimension. While it was chosen by the group to make the car a one sitter, Daimler explained that having multiple people in the car could improve the concept and make it even better. Since the space is limited however, this would not be possible. Daimler considered making the dimensions of the space larger for this reasons specific for this project but told the group that they first needed to focus on the concept being a one sitter and perhaps later on could implement an extra seat. At last, Daimler found this project to be really challenging and were excited to see its end result.

8 - Analysis recipes

From the analysed recipes (can be found below) several conclusions could be drawn; almost all recipes needed cutlery to cut the food. Also food needed to be heated, this was done in an oven, but mostly on a stove. Ingredients needed to be get out of the fridge and sometimes specific tools were needed to carry out a task.



Recepten analyseren:

- snijden
- verwarmen in oven
- verwarmen/koken op fornuis
- roeren (lepel)
- andere handelingen (handen/andere keukengerei)
- koelkast

Recepten

Wrap met shoarma: (4 personen, 15 min bereiden)

Verwarm de wraps volgens de aanwijzingen op de verpakking. Snipper de ui en snijd de paprika in reepjes.

Verhit de olie in de wok en bak de shoarma in ca. 3 min. al omscheppend bruin. Schep de shoarma op een bord en roerbak de ui en paprika ca. 3 min. in het bakvet. Schep de shoarma erdoor en verwarm alles nog even.

Bestrijk de wraps met de ketchup en verdeel de veldsla erover. Schep het shoarmamengsel in het midden en vouw de zijkanten van de wraps eroverheen. Vouw de wraps dicht en zet vast met een cocktailprikker. Serveer de wraps met de knoflooksaus.

→ zowel oven als fornuis nodig
↳ vooral verwarmen op het fornuis

Snelle cheeseburger: (4 personen, 10 min bereiden)

Snijd 8 sneetjes brood. Verhit de grillpan en gril het brood 2 min. Keer halverwege.

Gril de burgers in 5 min. gaar. Keer halverwege en leg op elke burger een plak kaas.

Snijd de tomaat en de augurken in plakjes. Verdeel de veldsla over 4 sneetjes brood. Beleg met de cheeseburgers, tomaat, augurk, ketchup en mosterd. Dek af met de rest van de sneetjes brood.

→ niet lastig recept / niet zo veel stappen
→ vooral snijden en handwerk
→ wel producten uit koelkast nodig

Lasagne: (4 personen, 25 min bereiden/40 min oventijd)

Snipper de ui. Schil de winterpeen en snijd in dunne plakjes. Snijd de bleekselderij in boogjes en rasp de kaas.

Verhit de olie in een hapjespan en fruit de ui, winterpeen en bleekselderij 5 min. op laag vuur. Voeg het gehakt toe en bak op middelhoog vuur in 5 min. rul. Voeg de tomatenpuree toe en bak 2 min. mee. Voeg 200 ml melk toe en laat al roerend op laag vuur bijna helemaal inkoken. Voeg de passata toe, breng aan de kook. Zet het vuur laag. Laat met de deksel half op de pan 45 min. zachtjes koken.

Maak ondertussen de bechamelsaus. Smelt daarvoor de boter in een steelpan met dikke bodem op laag vuur. Meng de bloem erdoor en laat op laag vuur 3 min. garen. Voeg op laag vuur al roerend 500 ml melk in scheuten toe. Voeg pas de volgende scheut toe als de vorige helemaal is opgenomen. Laat op laag vuur 2-3 min. zachtjes koken. Breng op smaak met peper en eventueel zout. Zet weg tot gebruik.

Verwarm de oven voor op 180 °C. Maak laagjes in de ovenschaal van achtereenvolgens wat saus, lasagnebladen, saus, bechamelsaus en kaas. Herhaal tot alle ingrediënten op zijn en eindig met een laag bechamelsaus en kaas. Bak de lasagne ca. 40 min. in het midden van de oven. Laat afgedekt met aluminiumfolie 10 min. rusten.

→ veel stappen: zowel oven als fornuis
→ veel snijwerk
→ goed opletten met koken: meerdere pannen op het fornuis
→ moet ook nog een tijd in de oven

Viscurry met kabeljauw: (4 personen, 20-30 min)

Voorbereiding: Kabeljauw in blokjes snijden en besprenkelen met citroensap. Uien en knoflook pellen en heel fijn snijden.

Bereidingswijze: In pan olie verhitten en hierin de blokjes vis plm. 2 minuten bakken. Vis met schuimspaan voorzichtig uit de pan nemen en apart houden. In restant vet fijngesneden ui, knoflook en sambal oelek 2 minuten al roerend bakken. Tomatenpuree toevoegen en even meebakken (zo verdwijnt de zure smaak van de tomatenpuree). Gemberpoeder, koenjit, koriander en kerriepoeder toevoegen en 1 minuut al roerend meebakken. Mango chutney en slagroom erdoor roeren en aan de kook brengen. 1 minuut zachtjes laten koken. Eventueel boter erdoor roeren (dat maakt de smaak wel heel erg zacht en lekker!) Vlak voor het opdienen de visblokjes erdoor doen en even mee verwarmen. Proeven en eventueel op smaak maken met wat zout.

→ één pan gerecht
→ veel snijwerk
→ koelkast nodig
→ vis

Salted caramel brownies: (16 stukjes, 55 min)

Start by making your caramel. Split the vanilla pod lengthways, scrape out the seeds, then place into a pan.

Combine with the cream, half of the butter and a good pinch of sea salt. Cook, whisking, over a low heat for about 2 to 3 minutes until it's just bubbling, then take the pan off the heat and set aside.

Place the caster sugar and golden syrup in a medium heavy-based pan over a low heat. Don't stir, just gently swirl the pan to help dissolve the sugar.

Turn up the heat to medium and keep swirling until the sugar turns into a golden caramel.

Take the pan off the heat. Discard the vanilla pod from the hot milk, then stir in the caramel with a wooden spoon.

Return it to a low heat while you stir in the remaining butter, then remove from the heat and set aside.

Scrunch up a large piece of greaseproof paper, make it wet (shake off the excess), then use it to line a 20cm x 30cm baking tin.

Pour in the caramel, sprinkle with another pinch of salt, and place it on a tea towel in the fridge for 30 minutes, until you have a thick, gooey caramel.

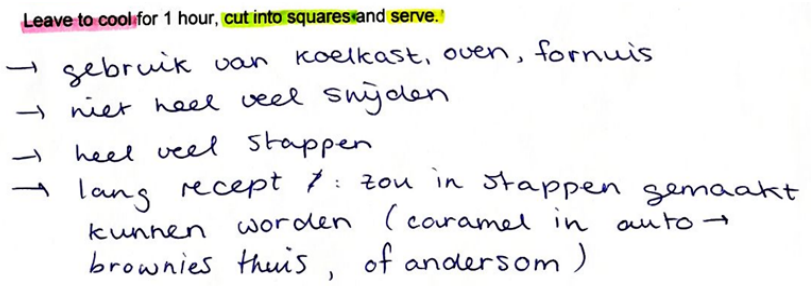
Once the caramel has been chilling for 15 minutes, start the brownies. Preheat the oven to 180°C/350°F/gas 4. Grease and line another 20cm x 30cm baking tin.

Melt the butter in a pan over a low heat. Chop and stir in the chocolate until it's melted, then remove from the heat and stir in the sugar.

Once cooled slightly, whisk in the eggs, then sift and fold in the flour until incorporated. Pour the mixture into the tin.

Take your caramel from the fridge, scoop out spoonfuls and dot them into the brownie mixture, pressing to submerge. Once you have a third of the caramel left, drizzle it on top, using your spoon to ripple it through.

Bake the brownies in the oven for about 25 minutes, or until cooked but still a bit gooey.



Second analysis

1 Chili con carne
- Can opener for corn and beans
- Strainer to drain the products
- Cut pepper (knife)
- Chop minced meat in pan, spatula Herbs + measuring cup for sauce

2 Broccoli + potatoes + meat
- Wash and cut broccoli (knife)
- Paring knife for potatoes
- Tongs for meat in the pan
- Boiling water

3 Pork cheese with cream sauce
- Clean / cut mushrooms (knife)
- Measuring cup for sauce
- Tenderloin in the oven with sauce, oven dish needed

4 Zucchini soup
- Cutting products (knife)
- Vegetable in the pan with boiling water
- Stick mixer to get everything fine

9 - Brand identity Daimler

Mercedes-benz

New Mercedes models must indeed formally create a bridge to the future, but at the same time their lines may not abandon their origin. This guarantees that every new Mercedes-Benz possesses a clearly recognisable identity and shows its pedigree at the first glance. The objective of the interior designers at Mercedes-Benz can be summed up in a few words: one gets into the car, closes the doors and immediately feels at home. (Daimler AG, 2019)

Maybach

The brand's style is embodied in sublime beauty, supreme aesthetics and elegance. Something very special is showcased for one sublime moment. This is not about wallowing in the past, but about forward-looking enhancement and refinement. The atmosphere is warm, light and airy. This is also underscored by the use of light colours, which symbolise the luxury of room and space. The long wheelbase of the Mercedes-Maybach vehicles offers crucial advantages for their passengers, who enjoy a maximum of space. This makes travelling in a Mercedes-Maybach a particularly prestigious experience and the pinnacle of comfort – with superlative legroom and maximum comfort when boarding and alighting. The maximum backrest angle is 43.5 degrees. The most upright backrest position of 19 degrees allows relaxed working in the rear. (Daimler AG, 2019)

AMG

The materials used are distinguished by their authenticity and very consciously establish a link to the high-technology world of motor racing. The use of contrasts, too, such as smooth – rough, soft – hard, shiny – matt, serves to emphasise the performance aspirations of AMG. The interior design echoes the design idiom of the exterior. Particularly striking: the interior of AMG vehicles is extremely sculptural in style and more oriented towards the driver than is the case with other brands sporting the three-pointed star. (Daimler AG, 2019)

Smart
smart sees itself as a future-oriented, visionary and premium brand that represents a great idea. smart stands for urban joy of life and is at home in the cities of the world. (Daimler AG, 2019)

ENERGIZING- comfort
ENERGIZING comfort control is a world first entering series production from September 2017: This optional feature links various comfort systems in the vehicle together. It systematically uses the functions of the climate control system (including fragrancing) and the seats (heater, ventilation, massage), the wall heating as well as lighting and musical atmospheres, and enables a specific wellness set-up tailored to the mood and need of the customer. This enhances physical comfort and performance while driving and during a break. (Daimler AG, 2019)

10 - Material research
Wood is the most common cabinet option; naturally occurring, solid wood. Examples: oak, hard maple, hickory, cherry, birch, ash, pine, bamboobirch.

Particleboard: wood crumbs or particles or non-wood plant debris is thermo-pressed together with adhesives.

Plywood: wood product that consists of a multi-layer board made by combining together very thin layers of wood.

Medium-density fiberboard: typically denser than plywood, MDF is a wood product made from smaller fibers than particleboard. It has clean edges and with a very smooth surface and superior screw-holding power. It is an affordable and versatile alternative to solid wood. (Zheng, 2018)

10 materials for kitchen countertops (Nafie, 2018)
1. Granite: almost impervious to heat, very strong and durable, very expensive, can crack if stressed or improperly installed, knives are quickly dulled by cutting on granite
2. Soapstone: deep rich color, somewhat stain resistant, damage can be sanded out, fairly impervious to heat, surface can scratch and dent (though this can create an attractive antique look)
3. Marble: waterproof and heatproof, expensive, stone is porous and stains easily unless sealed, can be scratched and repairs are difficult
4. Quartz: more convincing natural appearance than solid surface material, easy to maintain, resists stains and is impervious to heat and acid, expensive
5. Solid-surface material: resists staining, damage can be easily sanded out, integrated sink/countertop units are available, vulnerable to damage from hot pans, moderately expensive
6. Ceramic tile: affordable, immune to heat damage from hot pans, easy to clean, grout lines can stain and are difficult to clean, tile are brittle and may crack under impact, custom tiles can be very expensive
7. Laminates: very easy to maintain, very inexpensive, surfaces can be scratched and chipped (damage is almost impossible to repair), may be viewed as "low-end"
8. Wood: easy to clean, can be sanded and resealed, very long-lasting, can be damaged by water and stains, surfaces can be scratched and cut by knives, bacteria can be a problem if not properly maintained, fairly expensive countertop material
9. Stainless steel: impervious to heat damage, easiest of all countertop materials to clean, regarded as "premium" countertop, very expensive, can easily scratched (not a cutting surface), noisy
10. Concrete: heat and scratch resistant, costs are high, cracking may occur over time, "industrial"-look may be viewed negatively, surface is porous unless regularly sealed

Kitchen benchtops (Smith & Smith Kitchens, 2016)

- Laminate: common due to durability, availability, price, color and finish options. Never place hot pans or chop directly on laminate surface, it will scratch and chip if handled roughly.
- Solid timer: hot pans should be placed on a trivet and a chopping should be used during food preparation. Sun can alter the color of the benchtop.
- Natural stone: heatproof and resistant to scratches and nicks. It is porous and can be stained by oils and other ingredients.
- Stainless steel: extremely hygenic, easy to keep clean and capable to withstanding very high temperatures. It scratches and dents easily.
- Engineered stone and quartz: extremely durable and able to withstand extremely high temperatures and is much less porous than natural stone.
- Large format porcelain: does not scratch easily and it is heat resistant. It is remarkably thin.

11 - Questionnaire inspiratiehuis 20|20

1. What are the most important elements when people make a kitchen, why (working triangle)?
    a. Where is the tap most used for?
2. When people are limited to a small space, is this something that is kept in mind?
    a. Do compact kitchen devices exist?
3. IKEA Concept Kitchen 2025 → What are your thoughts?
4. With respect to innovative and innovative kitchens in the (near) future, how do you see cooking for you in 25 years?
5. What is the most important kitchen tool for preparing a meal?
6. Is there a difference between a kitchen for for a company or a household? (color composition etc)
7. Which materials are used to keep a kitchen clean? (Hygiene of certain materials?)
8. Are there also activities that often take place in the kitchen next to cooking?

12 - Questionnaire Keukenboer

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6. Is there a difference between a kitchen for for a company or a household? (color composition etc)
7. Which materials are used to keep a kitchen clean? (Hygiene of certain materials?)
    a. Which materials for the countertop choose people the most? Why?
    b. Is it important that cabinets are made of a certain material?
8. Are there also activities that often take place in the kitchen next to cooking?

13 - Alternative Ideas for the car of the future

Seamless transition

The car ensures that the transition from and to the car is as seamless as possible. This is achieved by matching the environment of where you're going to or coming from. Think about temperature, lighting and smell. This ensures that the car feels like a familiar environment that feels like your own property.

Multimedia integration

With the ever growing world of media, it is an important aspect to integrate into the car. Suitable for both personal and professional media, the car should be able to integrate all with the seamless transition in mind. Music playing at home should continue in the car, all media on your smartphone should be available in the car's multimedia system and you should be able to continue working on the built in PC system by just plugging in your laptop/tablet with USB.

Personal Dimensions
The dimensions of the car interior should be able to adjust to your physique. This means that the position, height, back angle, temperature and hardness of the seats should be adjusted automatically before you get in the car. Also, the car's suspension, acceleration speed, steering aggressiveness and driving style should be adjusted to your personal preference.

Eating and drinking
The car is equipped with both heating (oven/microwave/thermos) and cooling (fridge) devices. This allows you to prepare the final part of your meal in the car so you can enjoy a fresh healthy meal and avoid having to eat unhealthy fast food. Meanwhile your beverages are kept cool/warm depending on what you want to drink. The car also provides hot/cool water to make coffee and tea.

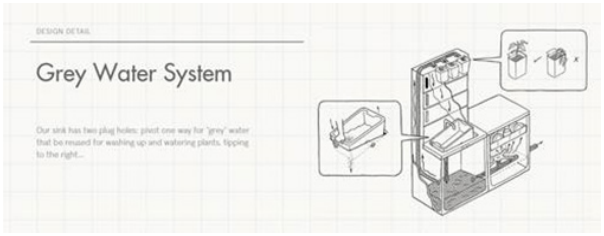
Sustainability
The entire car aims to be as sustainable as possible. The hot water provided in the car is heated by the main batteries of the car, to prevent the need of spending energy on a heater.
The main batteries are only used for driving the car and powering the electronics. The heated seats, air conditioning etc. are powered by solar energy. The entire car aims to use as much innovative and recyclable materials as possible.

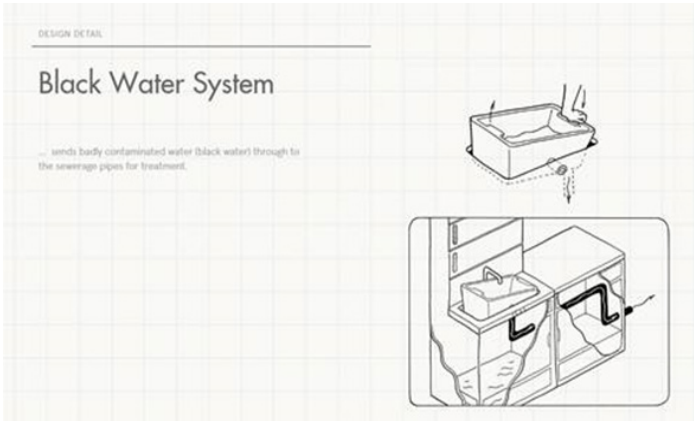
14 - Personas with a scenario
Persona 1: Els van der Vaart (47)
Els is a hardworking mother of three. She has a busy scheduled, which makes cooking a problem. She has a fulltime job as a nature-person and travels 2 hours to work every day. She is not always on time at home to cook dinner. For example Tuesdays are always a struggle, since she also sports that day, which means that she only has 1 hour to cook and eat.
Scenario 1: Els van der Vaart
On Tuesday Els is very busy, however since she has to travel 1 hour home from work. She is able to prepare dinner in the car, which is not only practically due to not having to eat dinner just before going to the gym, but it also gives her some more free time at home.

Persona 2: Dennis Bom (25)
Dennis is an outgoing guy who likes to hang out with his friends. He works as a primary teacher at a school only 20 minutes away from where he lives. Once a month he and his friends have a dinner party, where everyone has to prepare some food.
Scenario 2: Dennis Bom
The dinner party for this time is at a friend who lives 30 minutes away from Dennis. Since Dennis has to prepare a salad, he decides to take his salad ingredients with him when he steps into the car and he has finished the salad when he arrives at his destination. This means not only that he didn't have to hurry at home, but also that the salad he made is still fresh.

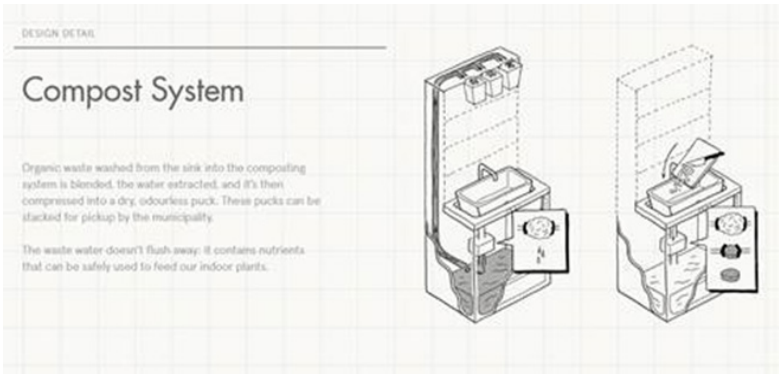
Persona 3: Sander van Genuchten (34)
Sander is a businessman who has often meetings in the evening, at which he needs to be present. The meetings are at different places, which means Sander has to drive to them every time. Since the meetings are in the evening, it most of the time means that Sander has to eat a pre-cooked dinner in the car, which he doesn't like, since he is trying to be healthy.
Scenario 3: Sander van Genuchten
Sander has to get to a meeting at 18.00, the drive is 2 hours so this means he has to eat in the car. Since he wants to be healthy he wants to make his food in the car. He is able to make his food in the car and he is able to eat his dinner before he arrives for his meeting.

15 - Research into kitchens
Ideas for tap (Ikea Concept Kitchen 2025, n.d.)





Tools in reach (Ikea Concept Kitchen 2025 n.d.)



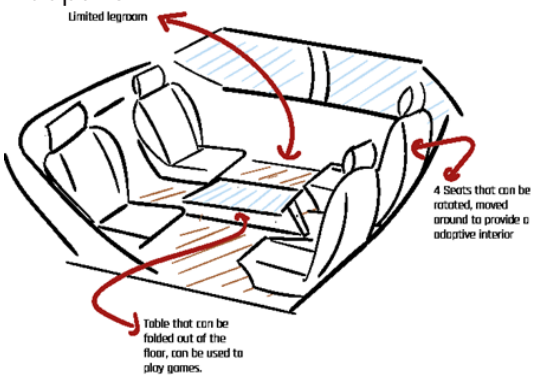
16 - Questionnaire on activities in a car
This questionnaire was done on younger people (students) and older people, the results will be shown below.

16.1 Questions in questionnaire "Activities in a car" (for students)
1. How do you spend your time in a car when you are a passenger?
- Working
- Looking through the window
- Talking with the passengers
- Using mobile phone or other device
- Sleeping
- Listening to music
- Other...

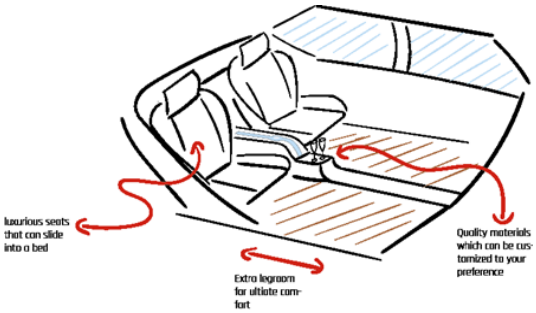
2. What do you find the most important thing of a car journey?
- Getting at the destination as soon as possible
- Having a comfortable trip
- The guarantee of safety in the car
- Other...

3. What would you do if you have to finish work in the car and you are with multiple people?
- Everyone has to be silent/turn the music down
- Other passengers should not adapt, I will just do my thing
- Other...

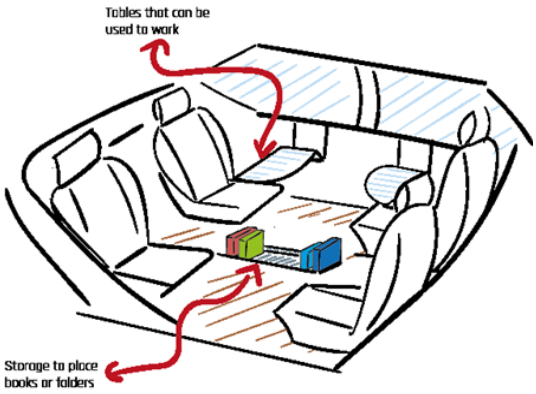
4. Choose one of the pictures you identify yourself with most:
- Adaptive



- Comfort



- Efficiency



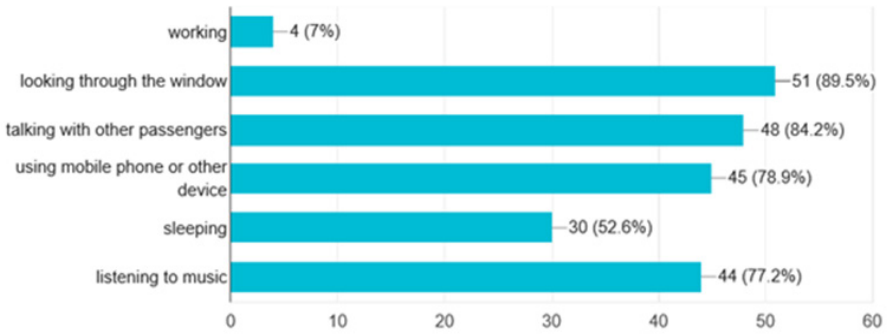
5. What is important for a comfortable car journey according to you?
- Enough headroom
- Enough legroom
- Enough daylight (panoramic roof)
- No road noise (silence)
- The driving style (easy on the gas, no firm braking)
- Other...

6. What would you like to do inside the car of the future? Think outside of the box…
- Open question

16.2 Results questionnaire young people (students)
This questionnaire was conducted by 58 students

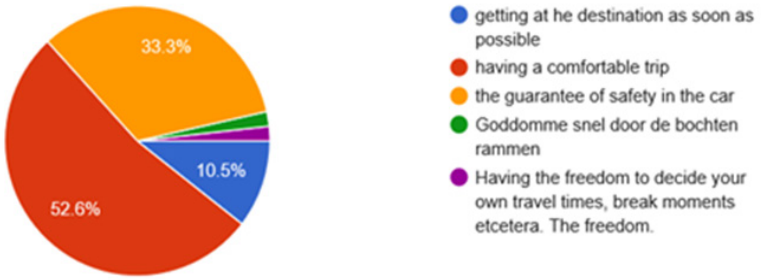
How do you spend your time in a car when you are a passenger?

57 responses



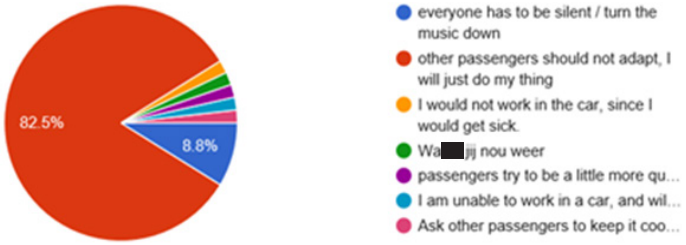
What do you find the most important thing of a car journey?

57 responses



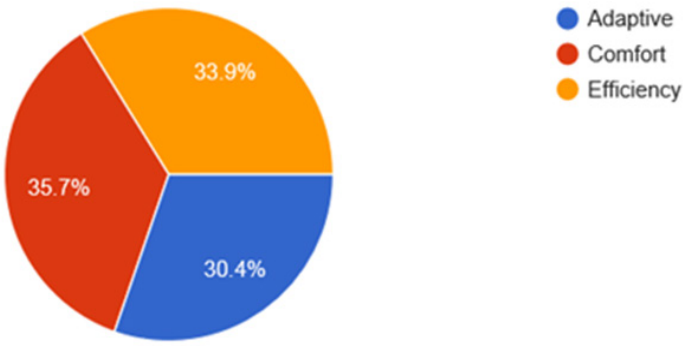
What would you do if you have to finish work in the car and you are with multiple people?

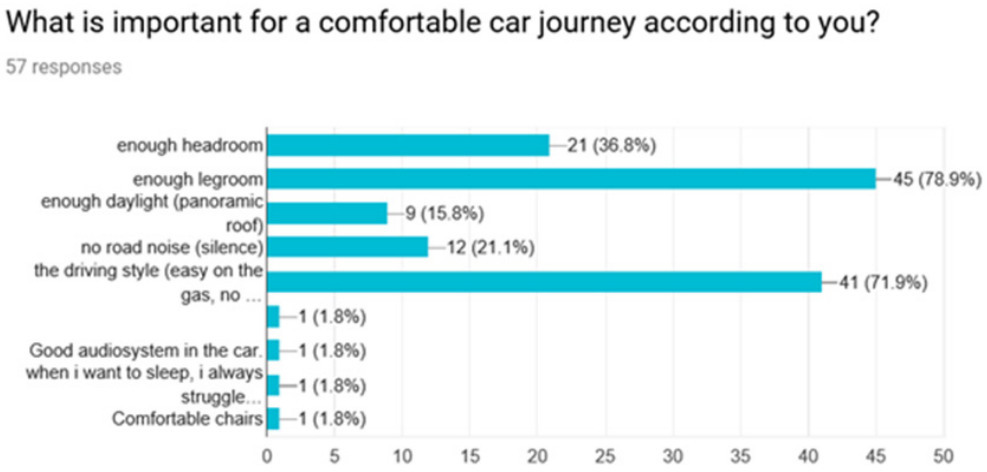
57 responses



Choose one of the pictures you identify yourself with most:

56 responses





Since question 6 was an open question, the answers of this question were analysed and visualized in a table:

Areas → Question 6 answers:	Comfort, sleeping	Making, eating food	Hobby, play games, work-out	Working	No specific area	Living environment
Super comfortable chairs						
Take a nice nap						
Make food						
Sporting						
Playing piano						
Play boardgames						
Drive						
Eat diner						
Read without getting motion sick						
Watch movie						
Hear turbo noises						

Drink coffee comfortably						
Teleport						
Live in the car						
Interactive games						
Interact with other cars						
Fly						
Have rotating seats so you can switch up you posittion. (safe)						
Bart Bongers						
Do my usual things; gaming; chilling with friends / sort of like a small house						
Live tv (voetbal) kijken en fatsoenlijk kunnen eten						
Making food						
sleep (with the seat transformed to a comfortable bed)						
Close myself off from the others so I can sleep/work						

Ability to turn off the speaker in my corner of the car, so the music can be localized to only the people that want to listen						
Play board games with multiple players						
Do my make-up						
Get home safely						
Have dinner/lunch/breakfast (a whole meal)						
Board games						
Being able to change the chairs into beds easily						
Body scan for diseases						
Have meetings for business or social interactions						
Have coffee when I go to work (coffee machine) and have a relaxing massage in my seat when I had a long day of hard working						
Wifi en spelletjes spelen op een tafeltje						

Sleep lying down completely, have a table to play board games, walk/stand safely, make food												
Shower, sleep without a very annoying position												
Be able to interact with others; play games, have conversation. Not looking at the road; windows a screen.												
Work, sleep												
Alcohol benuttigen												
Not worry about safety, and being able to have a private journey												
Stabilizing phone holders to watch netflix												
Have jam sessions, a stable chair to apply make-up, work out												
Doing my hobby												
Total	7	3	6	3	10	2	9	3	12	2		

16.3 Questions in questionnaire "Activities in a car" (for older people)

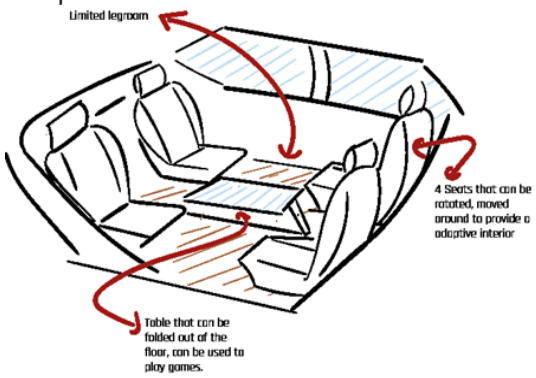
1. How do you spend your time in a car when you are a passenger?
- Working
- Looking through the window
- Talking with the passengers
- Using mobile phone or other device
- Sleeping
- Listening to music
- Other…

2. What is your average travel time in a car per trip?
   Fill in the amount of hours

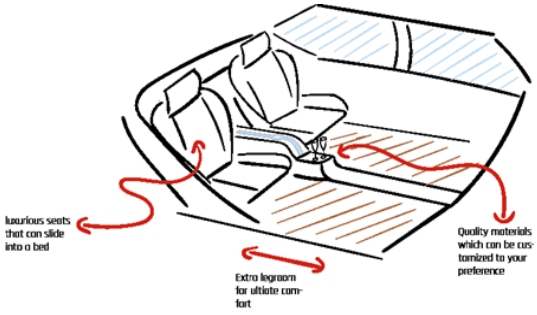
3. What do you find the most important thing of a car journey?
- Getting at the destination as soon as possible
- Having a comfortable trip
- The guarantee of safety in the car
- Other…

4. What would you do if you have to finish work in the car and you are with multiple people?
- Everyone has to be silent/turn the music down
- Other passengers should not adapt, I will just do my thing
- Other…

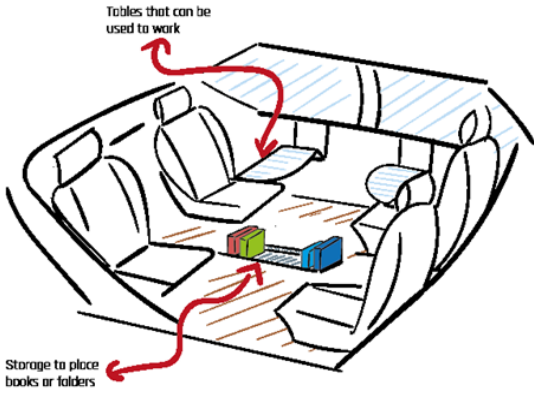
5. Choose one of the pictures you identify yourself with most:
- Adaptive



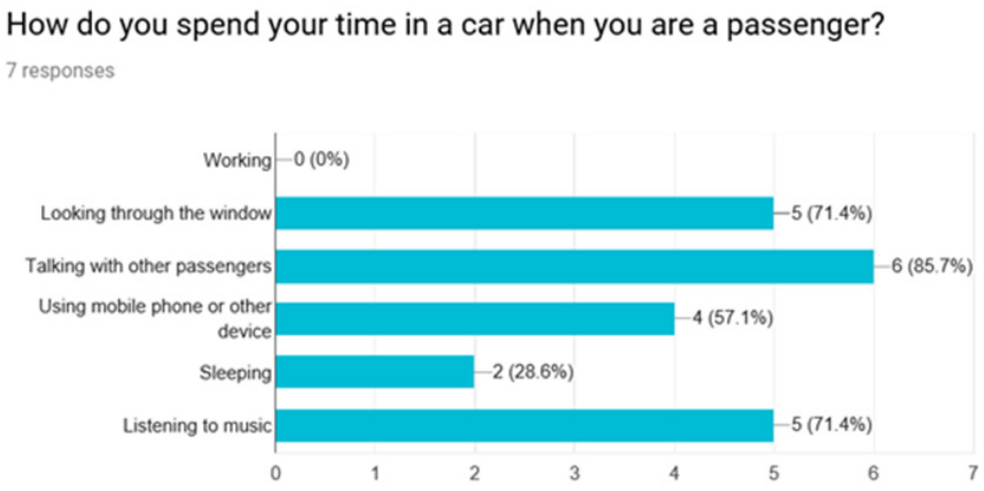
- Comfort

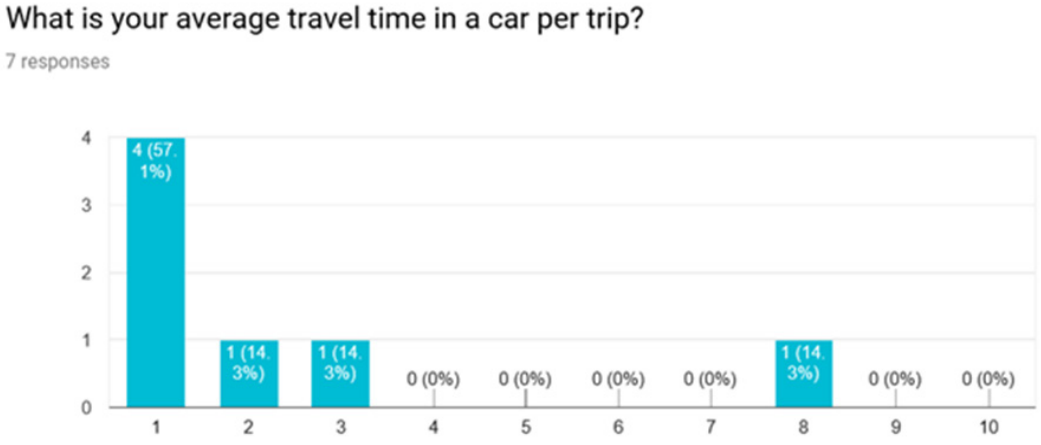


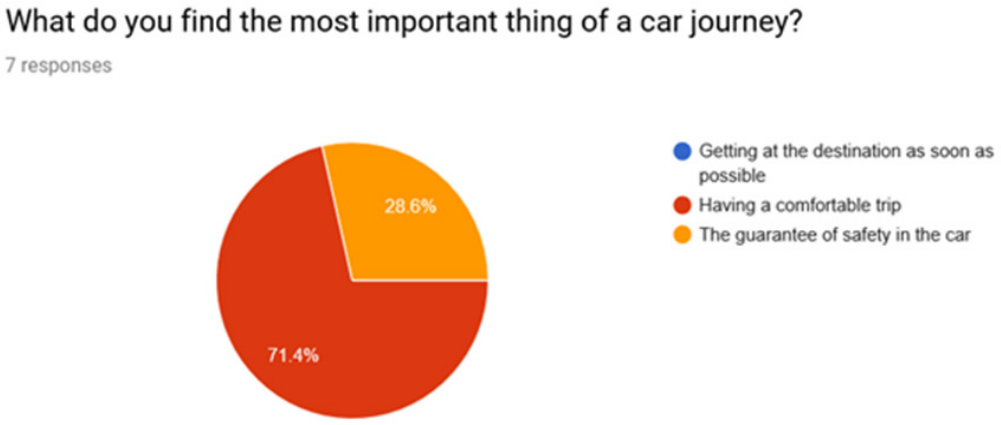
- Efficiency

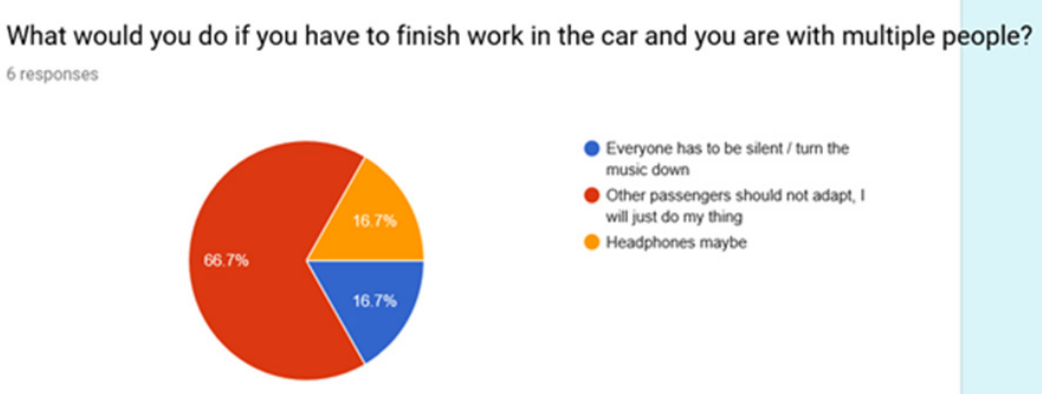


16.4 Results questionnaire elder people
This questionnaire was conducted by 7 elder people.



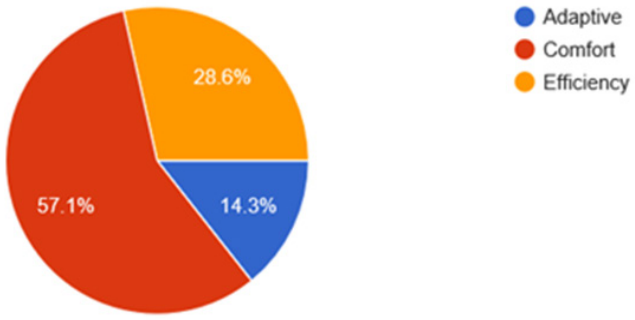






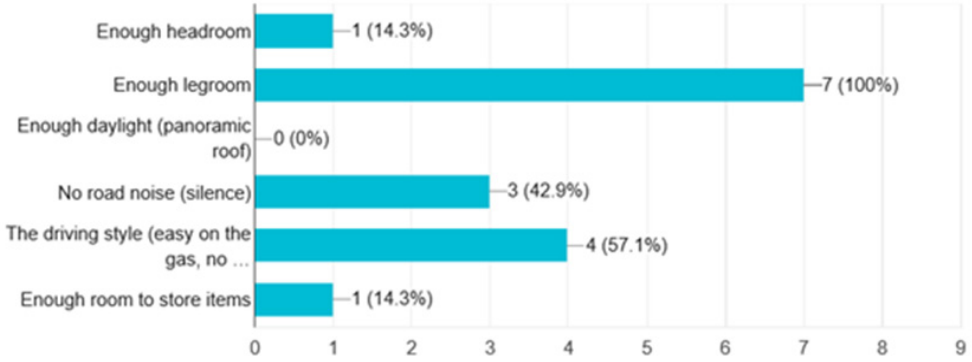
Choose one of the pictures you identify yourself with most:

7 responses



What is important for a comfortable car journey according to you?

7 responses



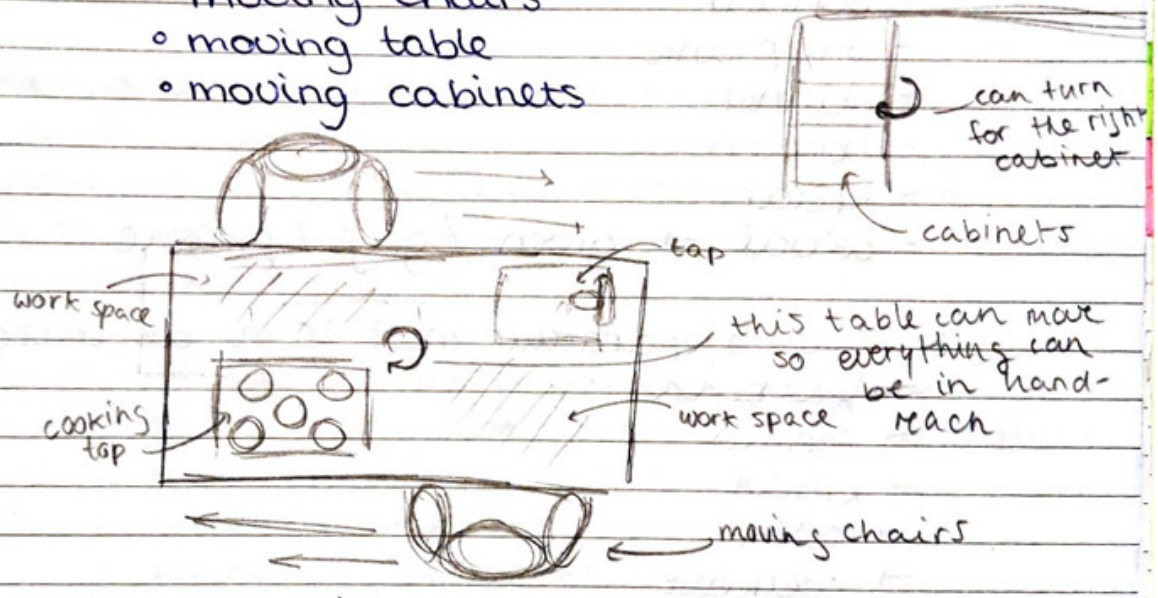
Areas → Question 6 answers:	Comfort, sleeping	Hobby, play games, work-out	Working	No specific area
Relax				
Read a book				
If you pass some special place of interest, next tot he highway, get more information about it: special architecture, cultural or landmarks.				
Private space				
Relaxed driving with less traffic on the road!				
Aan de computer zitten				
Total	2	1	1	2

17 - Sketches and notes of essentials in a kitchen

What is essential in a kitchen

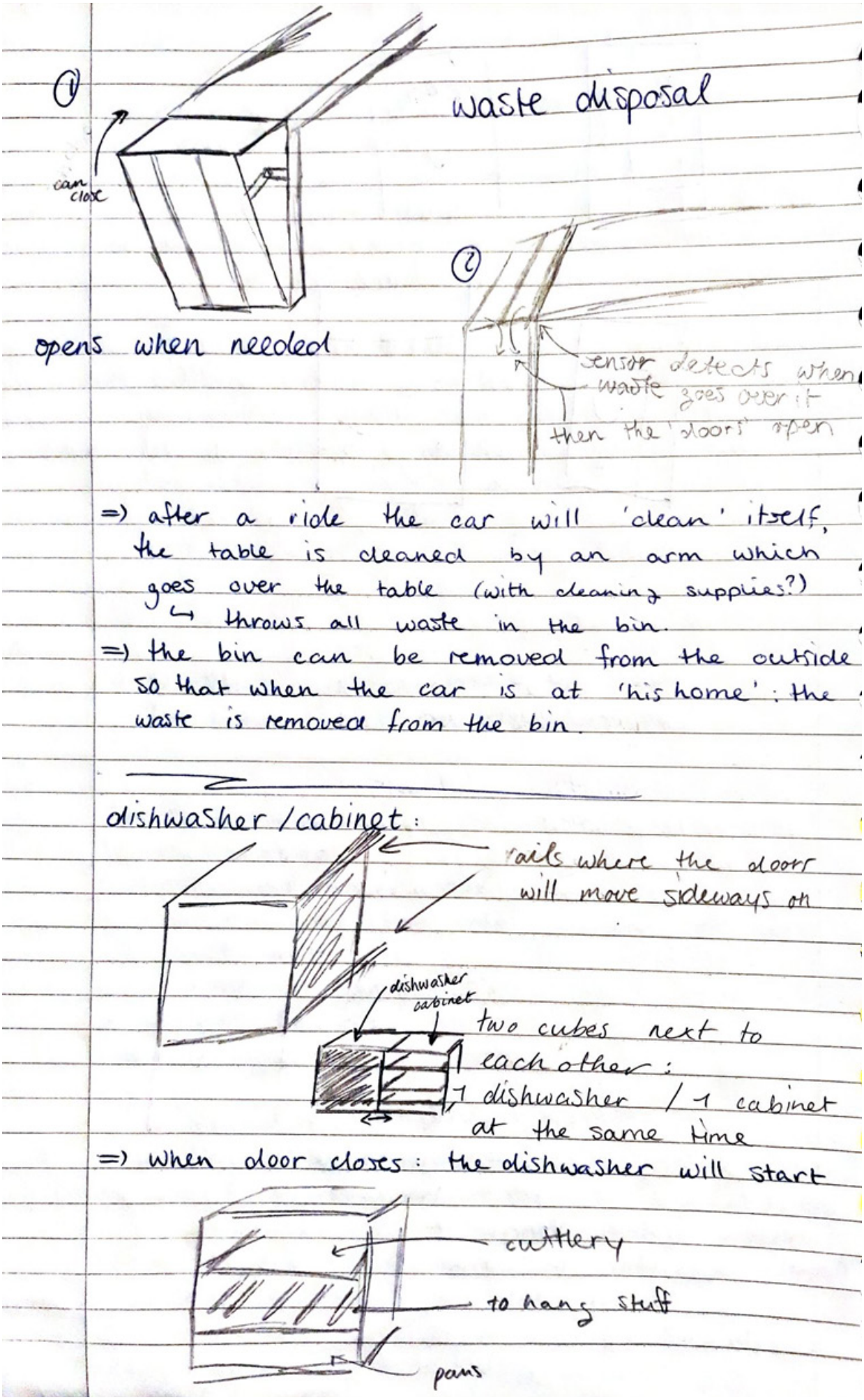
what is in a kitchen:
=) cooking top
=) place to cut food
=) fridge / cabinets to place food
=) cabinets to place ~~kitchenwear~~ kitchen tools
=) tap to wash hands / food or get water

what is needed:
=) enough room → to cut food / cook food / wash food / place food or utanzles
⇉ ↳ all things should be in hand reach when sitting in a car
- moving chairs
- moving table
- moving cabinets

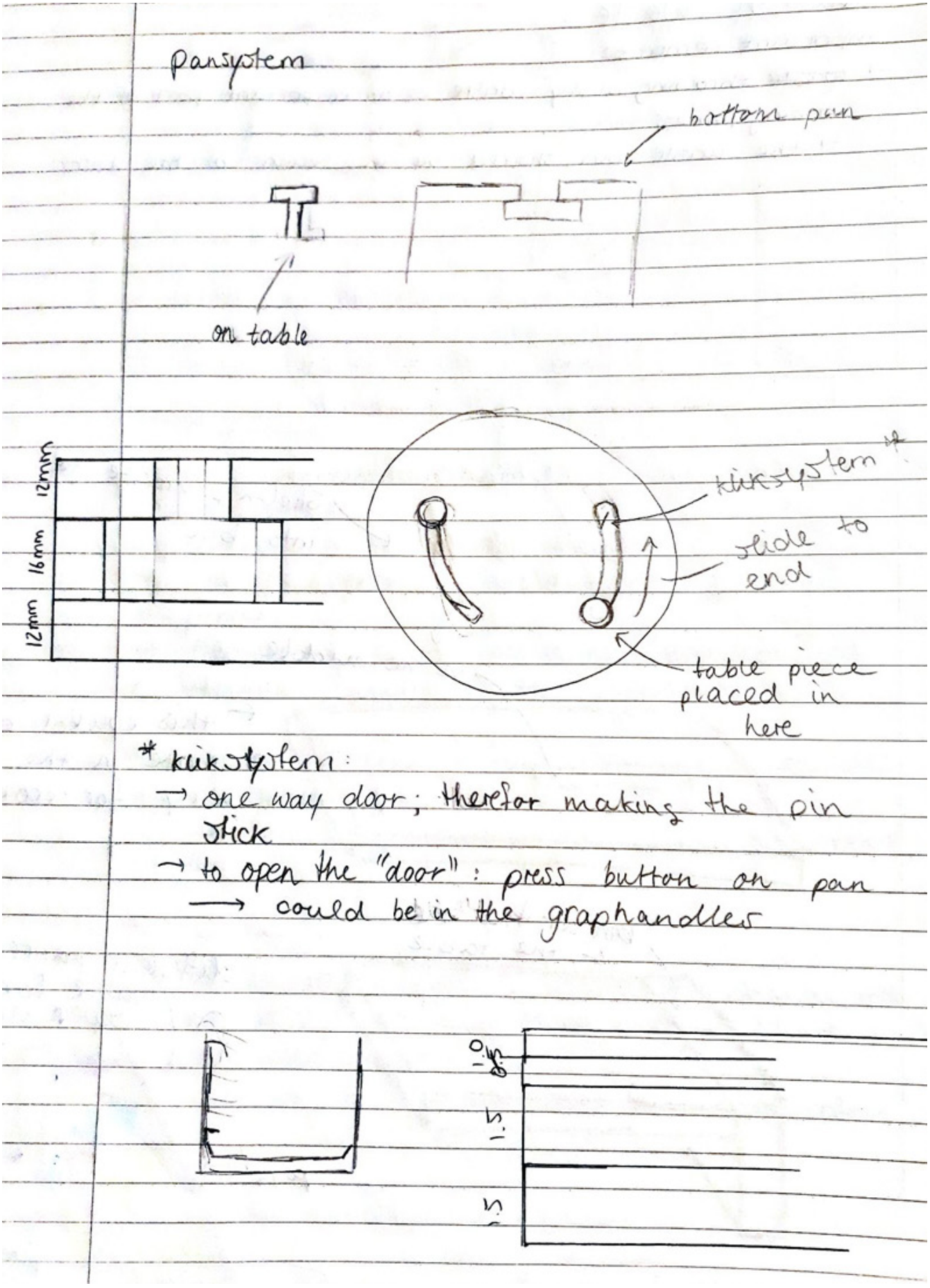


↳ the car still moves; how to prevent motion sickness
↳ „ ; how ~~to prevent people from~~ are people going to cut food → is it even possible?
↳ „ ; how to prevent all the kitchen tools from moving
↳ „ ; cooking food => is everything going to fall out of the pan
=) what is mostly used in the kitchen?
↳ does the user want a cooking top or oven or ~~magnetron~~ micro wave?
↳ where does the ~~kitchen~~ fridge go => needs electricity => does that give the fridge a standard place?

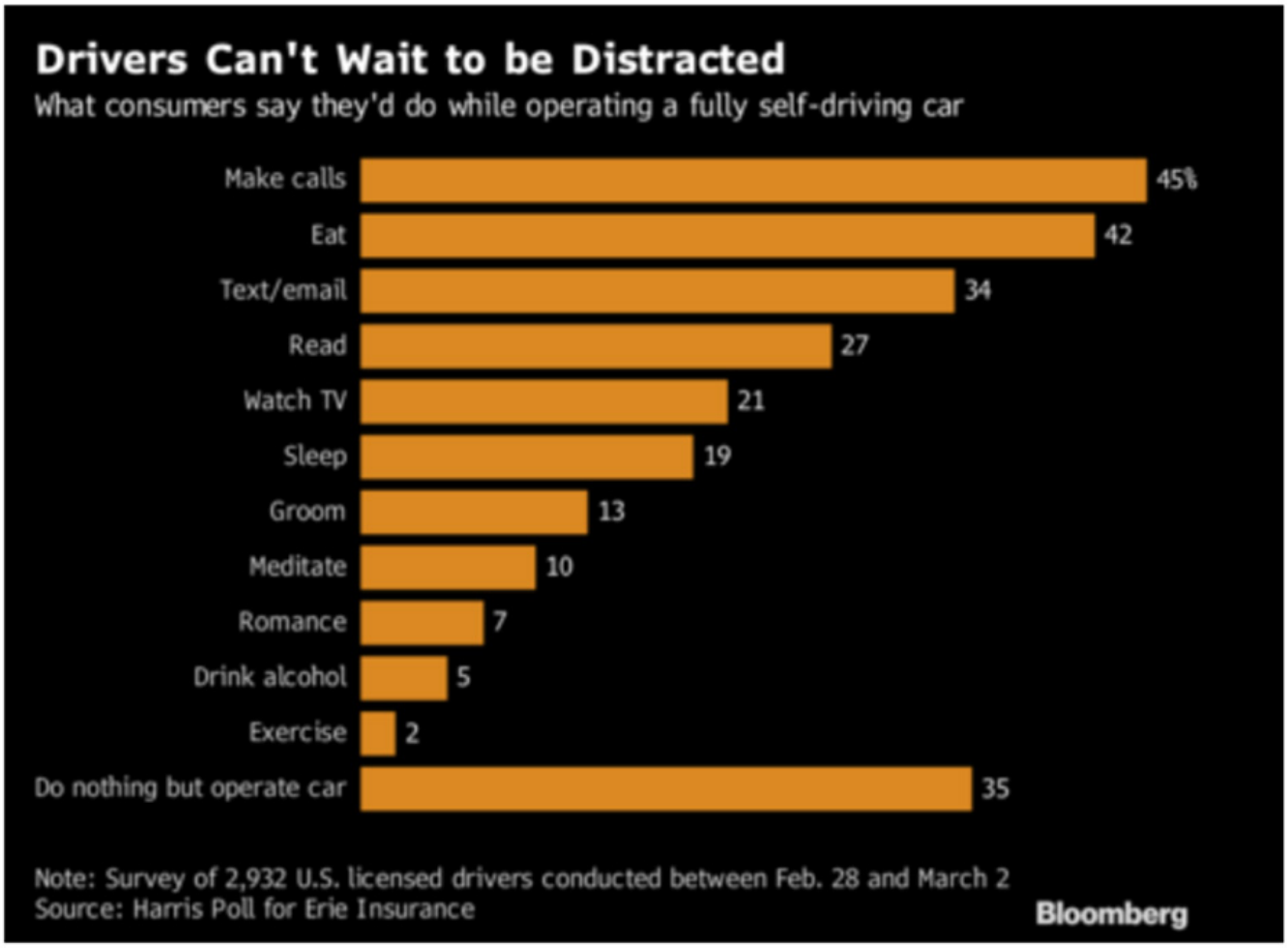
18 - Sketches of waste disposal system and dishwasher-cabinet



19 - Sketches and notes on click-system under the pan



20 - Bloomberg graphic
Graphic on what consumers say what they would do while operating a fully self-driving car (Naughton, 2017).



21 - Project planning

21.1 First planning

Week	Tasks	End of week goals (VR 10.30)	Individual tasks MA	Individual tasks WO	Individual tasks VR
1 (w37)	• Planning			B = L = M = I =	
2 (w38)	PDP draft inleveren (19-9) PDP inleveren (21-9) • Design brief • Daimler research • Ideation	- Design brief finished (deadline wo) - Concepts (+scenarios) - Vragenlijst		B = Brand Identity Daimler L = M = I =	
3 (w39)	Engineering Design midterm (25-9) 9.00-11.00 Plenary presentations of the pressure cooker results & first weeks (28-9) • Vragenlijst afnemen • Ideation en met concepten komen (wo) • Agenda maken en sturen naar Simone (wo)	- Presentation finished - Concepten kiezen waar we op willen focussen		B = tekeningen voor vragenlijst L = zoek contact met een persoon van Daimler / Interieur onderzoek (Zie notulen 21-09-2018) M = Presentatie maken I = Resultaten vragenlijst verwerken + in concepten	B = concept bed tekening L = zoek contact met een persoon van Daimler / Interieur onderzoek (KLM/stoelen/bezitting) / beïnvloedbare aspecten M = Presentatie maken / concept 2 tekening I = Resultaten vragenlijst verwerken + in
				verwerken / concept landmarks	concepten verwerken / concept landmarks tekening
4 (w40)	Calculus midterm (1-10) 9.00 Daimler guy (5-10) • Values re-defined (wo) • Contact Mercedes (Duitsland) and KLM • Ideation in future • Old questionnaire results verwerken			B = L = M = Contact Mercedes (Duitsland) and KLM I = Old questionnaire results verwerken	B = concept 1 bed idee L = M = concept 2 enhancing communication I = concept 3 koken in de auto
5 (w41)	Workshop (12-10) 9.00h Automotive Human Factors / 11.00h Report writing • Contact Miele, Siemens, Samsung, Bosch and Ikea • Onderzoek Foodtrucks, vliegtuig, schepen en campers • Wat is essentieel in een keuken • Future technology in de keuken	-		B = Foodtrucks, camper, vliegtuig en schepen L = Contacting people M = Future technology in de keuken I = Wat is essentieel in een keuken	B = L = M = I =

6 (w42)	DUTCH DESIGN WEEK • Ideeën voor de kraan / waar komt het water vandaan en naartoe? • Wat zijn spullen die in handbereik moeten zijn? • Welke apparatuur moet er in de auto zijn? • Waar komen de producten vandaan? - Minimaal 5 recepten analyseren - Kookproces onderzoeken → observeer waar iemand staat in de keuken			B = Hoe kan dit voor Mercedes zijn? Waaruit blijkt dat dit een mercedes auto is? L = Kijken naar andere bedrijven waar nog meer gemaild naar kan worden, al gedaan Ikea, Miele en Siemens (Bosch etc, keukenzaken, Miele experience center) + vragenlijst opstellen M = Vragen die de project coach kan bedenken (en deze uitwerken?) I = Scenario based persona's	B = L = M = I =
7 (w43)	Ma 22-10 Mevrouw *USE Empathy with the User (25-10)* *Engineering Design (26-10)*	• Ideation • Redefine direction and requirements		B = bewegingen in de auto (invloeden) / snijden+koken in auto	B = L = M = I =

	• Redefine personal goals			L = onderzoek in andere ideeën M = onderzoek in andere ideeën I = process koken / snijden+koken in auto	
8 (w44)	USE presentation (1-11) 9.00-11.00h Plenary pitches of the projects (2-11)			B = L = M = I =	B = L = M = I =
9 (w45)	Calculus final (7-11) • Brainstorm solutions + revise concept • Prototyping			B = L = M = I =	B = L = M = I =
10 (w46)	9.00h Rapid prototyping workshop (16-11) • Vragenlijst Bart+Inspiratiehuis 20|20 af (WO) • Evt Inspiratiehuis 20|20 (WO) • Test snijden low-fi prototypes (VR)		B = keuken observeren + report opdelen + waarom koken mensen? L = keuken observeren + ikea Bart mailen voor gesprek + recepten analyseren → 3 problemen uitschrijven +	B = ideation koken L = ideation kraan + aanlevering spullen M = I = ideation afval + afwasmachine/kast / Analyse kook observatie	B = keukengerei / R: project goal L = keukengerei / R: iteratie 1 (begin-3 ideeën presentatie 1) M = keukengerei / low-fi prototypes van snijden / R: iteratie 2 (3 ideeën

			waarom koken mensen? M = keuken observeren + snijden I = keuken observeren + keuken mensen bellen		presentatie 1-gesprek daimler) I = keukengerei / iteratie 3 (gesprek daimler-beslissing kookidee)
11 (w47)	• Prototyping • User tests		Vragenlijst gemaakt voor inspiratiehuis + meeting bart	Inspiratiehuis meeting	Meeting 2 met daimler
12 (w48)	*Workshop video? (30-11)* • Fotos prototypes		B = Schetsen layouts + mailtje Sander report + mes + inspiratiehuis notulen uittypen L = mail keukenboers + Q1 af + pan haptic feedback + report stukje inspiratiehuis + report layout M = reflectie + Q1 online + notulen	B = lay-out schets af L = koelkast research M = fotos prototypes I = dishwasher/cabinet af	B = L = q1 af M = I =

			inspiratiehuis + led pan I = iteratie 4 Q1 af + materiaal onderzoek + schets opslag/afval + vragenlijst keukenboer		
13 (w49)	9.00h Pitching workshop (7-12) • Final concept • Final prototype • Presentation		PROTOTYPES PAN/MES AF B = L = M = I =	B = L = M = I =	B = L = M = I =
14 (w50)	Physics midterm (12-12) 9.00-11.00h Plenaire pitching of the projects (14-12) • Presentation • Prototype • Report		B = L = M = I =	B = L = M = I =	B = L = M = I =
15 (w51)	DEMO DAY (21-12) • Report		B = L = M = I =	B = L = M = I =	B = L = M = I =

21.2 Planning for the last weeks