APPENDICES

APPENDIX A

Questions During Early Interview and Observation

Opening

1. Could you introduce yourself?

- name, age, current occupation

2. Cultural background?

- Nationality/origin country

- Did you grow up in . . . culture as well? Or maybe there is also another culture that influence your daily practices? Mixing culture?

- how long have you been living in NL?

3. Housing type?

- tell me about your housing type or your dwelling!

- with whom you are living?

Routine

4. Please tell me your routine in providing food or managing food for yourself/family!

When do you usually purchase the food/ingredients? How often?

Why do you apply that kind of practice?

Do you cook your food? When? How often do you cook?

5. What kind of food do you usually consume? for breakfast, lunch, dinner

Do you perform a certain diet?

what kind of dishes you usually cook by yourself? Could you pick one or 2 types that you cook most frequent?

6. what ingredients that those dishes need?

Preparation/Cooking Practices

7. How to prepare those food/dishes?

How long will it take to prepare those dishes?

Do you usually do quality check your food/ingredients before cooking or consumption? how do you sort or filter your ingredients?

How do you cut the ingredients? which part of the ingredients you usually keep or discard (do not use)? (example: bread crusts, stalks, etc)

do you usually have remained ingredients? what do you do with the ingredients?

8. How do you know/find the recipe?

9. Do you usually measure how much amount you will cook, like amount of food portion?

10. Do you ever experience cooking too much? the amount is more than you expected? How could that happen?

how do you deal with the surplus (remained untouched food)?

11. Do you ever experience failure in cooking that results in unintended/unexpected taste dishes?

what do you do with the food?

12. What kind of food waste do your cooking practices usually generate?

Consumption/Eating Practices

13. How do you usually eat your food? for example, you eat while watching tv etc, using a fork and spoon, where?

are there any certain rituals/rues you do before or while eating/drinking? (family rules, your culture, belief)

14. Do you ever experience leaving some food on your plate? or you cannot finish your food? why?

what do you do with that?

15. Do you usually have leftovers? What is it? Do you have any leftovers now?

what do you do with the leftovers?

how do you store it?

Do you reuse the leftovers? how do you reuse your leftover?

Do you face any problem to proceed with leftovers?

16. How do you identify whether your stored food is still edible or not? get spoiled, expired?

What do you do with the spoiled or moldy food?

17. Do you think you are quite aware of food waste? Could you elaborate more?

how do you define food waste? what kind of or which part of food/ingredients that you think are food waste?

Do you sometimes throw away food? how often? in what circumstance?

what food do you usually discard? why?

18. Sometimes, wasting food is inevitable. but, do you have any ways or try to prevent end up wasting more? how?

19. Adaptation when moving to NL? Regarding food practices and food waste

Closing

20. Could you show me your kitchen or walk around your kitchen?

Your fridge (inside), appliances, utensils

which one you mostly use? Why?

Documentation of Early Interview and Observation

How people store the food

What food they waste

Most of wasted food during preparation and consumption are avoidable and possibly avoidable type

Effort to reduce food waste

Food huggers to cover cut surface of fresh food

Early Interview Result

	Planning	Purchasing	Storing
Struggles	• Changing plan • Do not create any plans	• Oversized food package for one person (too big): vegetables, canned food • Impulsive buying due to discount	• some apartments/ student housings: merged fridge and freezer causes storing problem • forget food or leftovers in the fridge (located in the corner, covered by other products, out of sight) • stock up food too much
Opportunities	• clear planning (able to calculate and measure before purchasing) • sustainable cooking planner (app)	• encourage and guide the consumers to buy just "enough" amount • the retailers provide buying based on weight, even though it means cut some parts (not one piece), like Indian does • shopping assistance/ keeper: to buy based on what we have planned • redesign packaging/package size based on the food and portion	• a reminder to check the fridge/ storage regularly or before shopping • increase food (specifically for leftovers or perishable food) visibility inside the storages, e.g. redesign fridge compartments • increase knowledge of food shelf life and how to prolong it • A fridge which can detect almost spoilt food. it knows when the food is stored and its shelf life • A scanning system to give a date for each food enters the fridge

	Preparing	Consuming
Struggles	• lack of knowledge to decide whether some part of food is edible or not • lack of knowledge on how to reuse leftovers • discard edible part of vegetables or other food • Cooking failure could lead to food waste production	• misunderstood of expired date meaning (do not want to eat an expired food) • discard certain food due to "dislike" reason
Opportunities	• swapping food leftovers with neighbours • enhance knowledge of meaning of expired food • how to know your one portion sooner? not after years of experiences • only cook food that we would eat • A recipe suggestion for the leftovers (an app) • guidance book: how to cook sustainably in NL without losing your food culture (for new comers) • design a tool to measure individual portion (not as general as current product, more customized)	• sharing surplus food app/service • make people appreciate food they have more (being grateful) -> show how the food ends up in their hand

APPENDIX B

Photodiary Booklet

Task 2: Groceries Arrangement

DAY 1

Food Storage Story

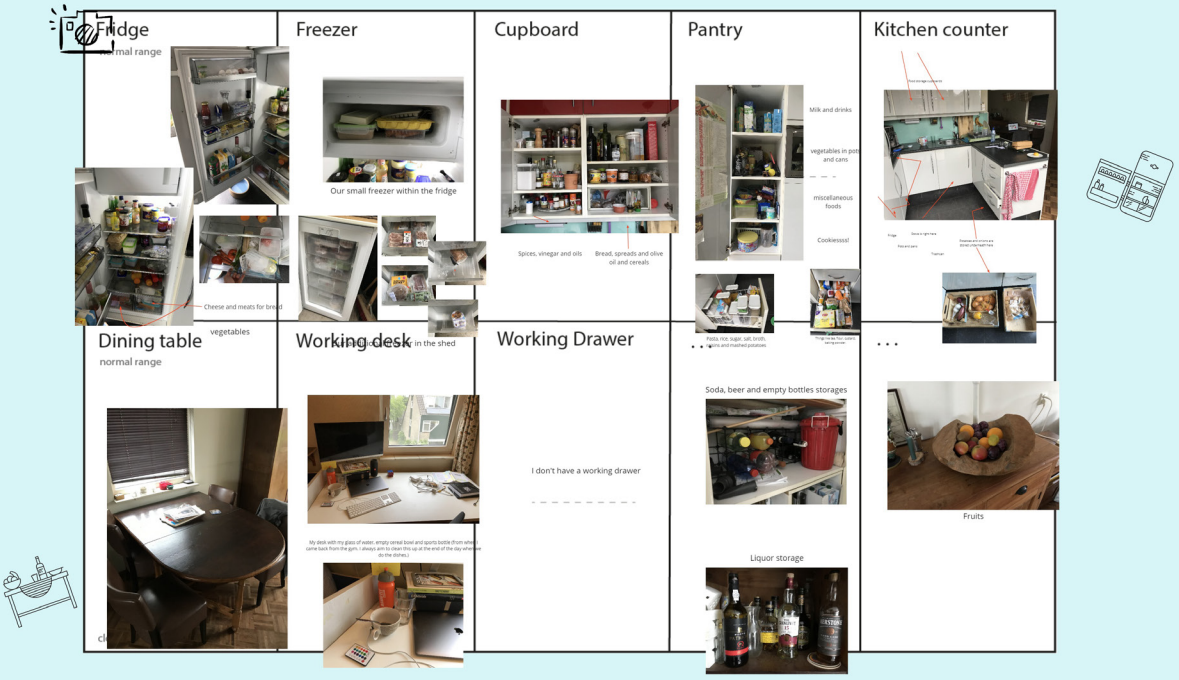
Spots to put my groceries away . . . ?

Time to fill in:
Day 1 and Day 5

This section is about telling any places to keep your food

Activitiy: please take a picture of places where you keep the food (open condition).

If you cannot find the options below, please add yours on the blank box. please include as complete as possible.



please elaborate your answer here!

double-click to answer

DAY 5

pictures at the last day

Fridge	Freezer	Cupboard	Pantry	Kitchen counter
normal range close-up range				
Dining table	**Working desk**	**Working Drawer**	...	...
normal range close-up range	Desk was still the same			

Did you purchase groceries within the research time? when was it?

Yes, on Saturday

How often do you go for food shopping in a week?

Once for the main groceries, sometimes I go more often but that is usually to grab only a few items like a fresh juice or a protein bar.

free space for your thoughts or opinions or ideas

Task 3: Organizing Food Storages

DAY 2

How I manage my food storages . . . ?

How often do you check and reorganize those storages you mentioned above?

We usually get our groceries once a week. The way we check what we need is by running through our storage places and see what we miss. We also have a small grocery list that we fill in when we have emptied something (e.g. yesterday I emptied our Curry sauce bottle, so my mom told me to write it down on the grocery list)

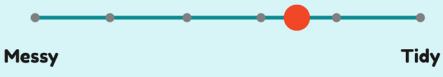
When we have gotten our groceries we put everything in its respective place and maybe move some stuff around a bit, but we never fully reorganise our groceries. The way we have it now we've had it for years, because this works well for us.

How do you feel about the way you manage your food storages?

It has become a routine which works well for us. We always know where to find what. I guess our system could be a bit more efficient though, since we don't always write down what we miss on the grocery list. So every week we have to do a double check on what we need. That isn't too bad however, because we only do groceries once a week.

if you are asked to categorize your type of organizing food at home, where would you place the red dot?

please put the red dot over the small grey dot!



Could you elaborate your thoughts?

We have a designated spot for all the groceries we buy. Within the cupboards it is not necessarily particularly tidy, but that is okay, because it is all out of sight and we know the things that we can find on each shelf.

how do you feel about it?

feel free to us[illegible] drawing or image to express yourself

How do you feel about your current food storages?

Our current food storages are nice and practical. Most things we keep out of sight, except for our fruits. We keep those in sight in order to be reminded that we have to eat fruit and to check whether some of them are going bad. In this way we waste as little fruit as possible.

Do you find any problems about those storages?

Looking back at the photos I can see that it is a bit untidy, but that doesn't bother me because it is all stowed away behind closed doors.

One random problem that I had last week is that my cereal box was slightly too tall for the cupboard (only about 4mm or so), so I forcefully pushed it in to make it fit.

Task 4: Taking Care of Your Food

DAY 2

This section is about telling your daily interaction with food. There is one activity which should be filled in every day at anytime.
if you need more room to detail your answer out, feel free to add text box or change the box size.

How do you perceive food for your daily life?

How do you value food?

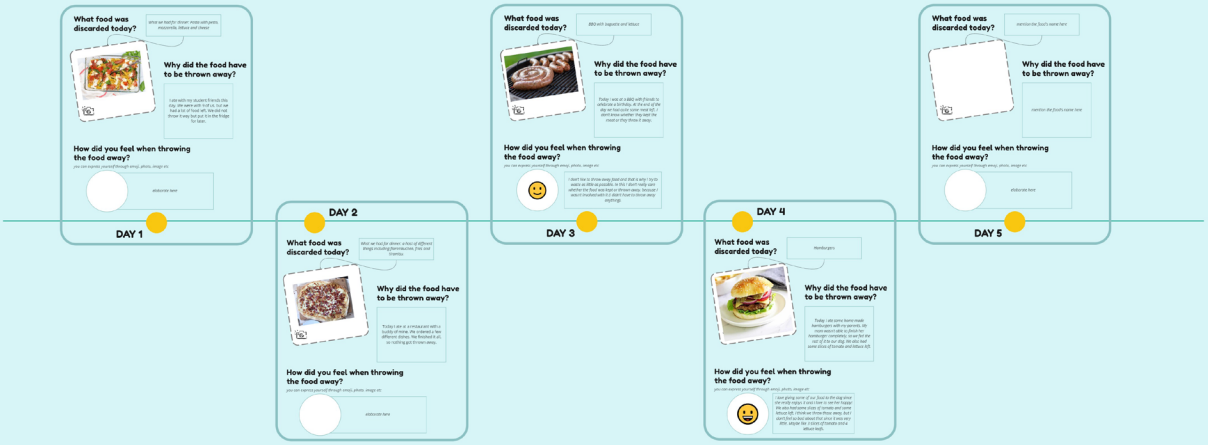
I do not take a lot of time to think about what I eat. It is mostly based on habits what I eat and when I eat. With regards to meat that changed though, since I am doing a project on it now so I try to eat less of it.

With regards to breakfast I always eat the same. That is: the cereals that I chose to buy when doing the groceries on the Saturday before. With regards to lunch I usually eat bread with cheese and/or the spreads that we have laying around. For dinner we usually have vegetables, meat (or a meat replacement) and potatoes/rice/pasta (or the like).

How do you track your food stock level?

We have a grocery list (a small piece of paper) laying around in our kitchen. On that we usually write down what we have emptied / run out of on that day. We don't always do that with everything. For example, our toilet paper or soda's or milk we don't write down, since we check those things every Saturday anyways before we go shopping. However, the things that we don't use so much (e.g. tomato ketchup) we always write down, otherwise we'll definitely forget about it.

About food ending **EVERY DAY**



Task 5: Displaying Food

DAY 3

Showing off food at open space . . . ?

Do you usually display or put some food at open space at home such as on the kitchen counter or dining table all day?

"yes"

photo

What kind of food are those?

A fruit bowl with oranges, apples, kiwis, plums and a lemon.

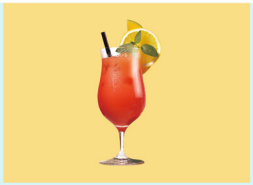
I display my food because . . .

The fruit and bowl combination looks good. It kind of acts as a decoration and it also reminds us to eat fruit. It also allows us to see whether the fruit is going bad if we forget to eat it.

"no"

I never display my food because . . .

double-click here to answer



Task 6: Your Ideas, Your Vision

DAY 3

Time to fill in: Day 4

Let's share what you think for future!

you can upload photos or draw something or add links to express your ideas that you think might be helpful and write your words in the box

What do you think of the ideal way to keep having enough food at home, but not stacking too much?

Something that you can see remotely what you still have in stock at home. Maybe something like a camera in the fridge or cupboard. Or maybe a system with which you can scan the barcodes of everything you put in or take out of the fridge or cupboard. This will keep track of anything that you will have and will miss. I think that second one is better, because not everyone likes cameras everywhere.

Or a system similar to this one:
https://www.hammacher.com/product/voice-recognition-grocery-list-organizer-1

What do you feel the best way to remind you that you still have food at home?

Something that you can see remotely what you still have in stock at home. Maybe something like a camera in the fridge or cupboard. Or maybe a system with which you can scan the barcodes of everything you put in or take out of the fridge or cupboard. I think that second one is better, because not everyone likes cameras everywhere.

What do you think of ideas to encourage you to consume ot finish most food you have before buying again?

Could work, but may not be the best solution for all types of food.
For example, when you buy rice you never eat the full pack of rice. And so you don't want to eat rice for 5 days in a row to empty the pack before you buy an alternative like pasta. I would rather open the rice to eat it and then also buy pasta before the rice is gone, because you can keep rice for a long time.

But if the question is about leftovers then I think it is a good idea.

How do you envision good ways to prevent food waste at home?

Have something like an app or computer programme that makes recipes out of the left over ingredients that you have. Or something that tracks how much you have eaten of something before, so that you won't make too much when you make the same thing next time. (E.g. I always forget how much pasta I had made the time before and therefore I always make too much when I cook) In that way you wont cook too much.

Task 7: Origin Culture

DAY 4

Let's talk about your origin culture!

Time to fill in: Day 5

Could you tell how your family or your origin culture context usually do all the above matters? (if you are not Dutch, you can share your habit when you are living in your origin country)

How do you put the groceries or food away?

We store the food in the cupboards, fridge or freezer. My parents use the freezer a lot to keep meat and bread for a long time.

How do you organize the food storages?

Through the years we have built up a system of organising stuff that works well for us.

Do you "show off" your food? what the reason behind it?

Only the fruit (as explained before). But the reason is not to "show-off".

How do you track down your food stock at home?

We run through all our cupboards and the fridge before we go shopping. Additionally we have a grocery list that we use every week when we go shopping.

Share your pictures here

Task 8: Opinion For Ideas

ANYTIME

What do you think of below ideas . . . ?

IDEA 1: Food Scanner and Reminder

What is it?

A product to support people to put food away in a correct way and to memorize what food people have at home. This product which should be placed around the kitchen.

Features:

- Scanner: it scans food barcode or appearance to determine where people should keep the certain food. Therefore, people do not need to worry about storing mistakenly and reduce food shelf life. A
- Alarm: (1) After scanning, the product system will note the date when the food comes. In order to keep aware of food stock, every day (you can decide how frequent you want to turn on the alarm) it reminds the users whether they have consumed specific food or not. (2) The alarm will warn the users about almost expired food.
- Recipe suggestion: if people need idea to cook with food ingredients they have, it can provide several suggestions. As the users already scan their food, the system can easily find a delicious dish to cook.

What do you think of the idea?

I quite like it. I think it could be a very useful product. I wouldn't want it to give an alarm noise, but I would rather have it send a message to my phone between 17:00 and 18:00 before I get ready to cook.

The suggestion for where people should keep certain foods could be handy for some people, but I think that will be limited. Most people know where you should keep certain items. The only time when I get confused with that is with certain vegetables, but that doesn't happen often.

How do you like the idea?

Dislike — **Like**

Nice system that keeps track of what you have. Recipe function is also very nice

How useful do you think this idea will help you to reduce food waste at home?

not useful — **very useful**

Helping with finding recipes to cook meals that will almost expire will save me a lot of time and effort in finding all that out. It will minimise what I waste.

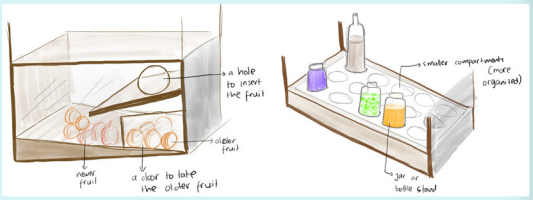
IDEA 2: New Fridge Interior

What is it?

A new design of fridge with sliding system to ease people see and check preserved food. Common door design is modified with sliding mechanism and the compartments are redesigned to encourage the users to consume older food first before it gets rotten.

Features:

- Sliding door and compartments: two sides of compartment are open which increase food visibility inside the fridge and help the users to be more aware on food they are keeping, specifically for perishable food such as leftover, vegetables and so on.
- Predetermined compartment function: (1) there is predetermined division for each compartment based on temperature grading (sections closer to the machine in the back will store food which need cooler room). (2) In every big compartment (per floor), there are smaller compartments or holders to organize food and create storing limit to encourage the users to purchase only "enough" food to prevent getting wasting food
- Special fruit compartment: storing and taking door are separated. Older fruit will be near the "taking door", so that it can be always enjoyed first.



What do you think of the idea?

Creating a storage limit is a bad idea in my opinion. Who are we as designers to say how much food someone is allowed to eat? Also, this differs a lot between families and families are dynamic. Older kids eat more than younger kids, elderly eat less than younger adults. It would be very complex and will probably not work out.

How do you like the idea?

Dislike — **Like**

I like the idea a lot. I sometimes do experience it myself that I leave something in the back of the fridge and then I forget about it. When I get to see it better I am less likely to forget about it.

How useful do you think this idea will help you to reduce food waste at home?

not useful — **very useful**

The better visibility will help me to waste less food.

IDEA 3: House Slippers to Prevent Food Waste

What is it?

house slippers that can communicate with trash bin to evaluate the wasted food (is it actually still edible or not). The slippers also can "talk" with an app (with friends within a community) and other slippers (for non-single household) to encourage each other to do better in reducing food waste.

Features:

- Smart trash bin: there will be two compartments which is connected by a "door". The first section is a room where the trash bin system can identify whether the wasted food is actually still edible or not. The second section is the real trash bin, to collect the disposed food. If the system states that the users throw edible food, it will send a message to the users via an app to get the answer why the food was discarded. By knowing the reason, the system will offer some solution to try, so the users can act better in reducing food waste.
- Slippers - trash bin communication - the app: slippers is chosen because most people wear house slippers at home. This type communication only works for non-single household. The trash bin will recognize who waste edible food and inform other family members to tell or help this person to do better (be more sustainable together)
- Slippers - app - community: this is aimed for the single household. this can give the similar function with the previous feature, but the person will be connected with her/his friend within the community.

What do you think of the idea?

The addition of the slippers seem to be quite unnecessary. The trashcan could also work directly with a smartphone. Also, I know plenty of people who do not where house slippers. For them this product would be useless.

Next to that, I would not wish to receive messages that someone else is throwing away food. This would distract me during my work or during my driving. Additionally, at home we usually decide together what we would like to keep as leftovers or throw away right after we have had dinner, so the alert system wouldn't work for us.

Finally, I have a feeling that many people have decided to throw away certain food it is very difficult to convince them to keep it. They simply don't want it anymore.

How do you like the idea?

Dislike — **Like**

See explanation on the left.

How useful do you think this idea will help you to reduce food waste at home?

not useful — **very useful**

See explanation on the left.

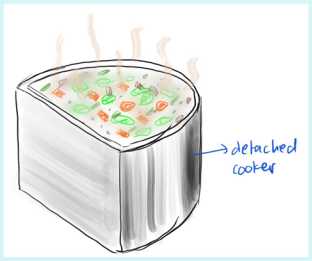
IDEA 4: Magic Dish Maker

What is it?

The product is about an appliance to cook quick and unique dishes smartly. Adding the food ingredients (new or a few remained ingredients) can help decide what menu to boil and cook it for the users. The main aim of this product is to help the users reuse the leftover(dish or remained ingredients from previous cooking).

Features:

- Cooking function: it will do preparation (e.g. chopping, peeling, etc.), the cooking session (e.g. sauteing, boiling, steaming, making soup), and cook just "enough". Before starting the process, the users will be asked about how many portions they want to make. There will be several compartments for cooking and placing the ingredients. A few cooking sets are available to accomplish various dishes. The users only need to disassamble and assemble specific compartments.
- Recipe suggester (menu selection): the users should enter what kind of ingredients they want to use. The system will recommend a few options based on the information. After one menu is chosen, the product will guide the users about what steps to do.



What do you think of the idea?

I like that it basically cooks for me and that it makes only just enough. However, it does not keep an eye on my inventory like the other concepts do. In that sense I think it may not be as effective as the other concepts.

How do you like the idea?

Dislike — **Like**

It basically cooks meals for me so it basically saves me a lot of time and energy

How useful do you think this idea will help you to reduce food waste at home?

not useful — **very useful**

It will help me to cook just enough, but will not inform me on my inventory and what is about to expire.

Your Choice

After Finishing Idea Proposal

Which idea suits you the best . . . ?

you are free to draw or add pictures to explain your answer

Among those four ideas, which one do you need the most?

concept number 2 would fit me the best.

This is the only concept that I could see work well in my life. It also solves an issue that I have actually encountered with regards to food waste. Concept number 1 is nice as well, but I think it would take a lot of time to scan all my groceries. Concept 3 is not good at all I think. Concept 4 is nice, but it is not very good for preventing food waste. Also I think that one would be very expensive and hard to clean. That would be a bit of a dealbreaker for me.

You have authority to develope the idea you chose, how will you improve the product?

I would add see-through storage containers to the concept. I see that you have that already, but I don't think you did it on purpose. We always have like 5 storage containers in the fridge with leftovers in there, but they are not see through. So you don't always know what is in there. It is a lot of hassle to open them up, so having see through containers that would fit the fridge exactly would be very nice.

Combining this one with the smart elements of concept 1 would be very good and even more effective. Although I must say that I also like the non-tech solutions in concept 2 very much.

Follow–up Questions Full Version (one example)

Task	Questions	Answers
1	-	
2	fridge: what is inside the aluminum foil? freezer: what's in the container? Green lid The food stock is quite a lot (full), did your family just go shopping or something? For how long those food? It is interesting that you put pasta in a special container, not in its original package? Why? Day 5: kitchen counter -> you have laid down fruits and a half lemon? You have a special bowl for that right?	Some sweets from AH I bought yesterday It is yoghurt made by my mom Yes Yes, it eases us to see how much pasta left and determine when to refill it Yeah, but putting these half lemon and some browning fruits on the kitchen counter encourages and remind us to eat it soon
3	Who is the most responsible person in the house to manage the food? Once a week shopping -> what about vegetables? Can they stand for one week?	My dad We only buy necessary amount
4	I am being impressed with the way your family tracks down the food you have. how could this work? Some people might get too lazy to write everything or maybe tend to forget Pasta with pesto -> Did you finally eat it again? Bbq with friend -> how do you feel if the case is your parents who throw away the food?	I already get used to. I did it since I was a kid. That's our house rule It was food I had when having dinner in my friend's house. So I do not know if my friend finished or disposed it
5	Do you usually finish everything or in what occasion usually some fruit getting rotten?	We try to finish it, but sometimes we miss a few of it when older fruit is covered by the new one

6	What could encourage you to reconsume meal leftover?	I do not mind to eat leftovers
7	-	
8	I think your opinions about 4 ideas are helpful. And you explain quite detail, so thank you. Idea 2: so you like the way it increases food visibility, but not the way it gives limitation? "I would add see-through storage containers to the concept". Could you elaborate it more? Some containers are already transparent (the body) and some have transparent lid as well	Yeah because the idea has a specific frame with the same hole size to support bottle. But we know that bottle size are various.
GQ 1	What do you consider when you choose or purchase food? if you should order these based on the most prioritized, how would it be? why? • Healthiness • Price • Enjoyment (taste) • Hospitality (provide something good for other people -> family, partner or anyone) • Trying new stuff (curiosity) • Etc	habit: same stuff every week (1) Enjoyment (2) Price (3) more efficient to buy the similar items, go for budget brands. Try new recipe or food but not often. Less healthy diet -> sugar based breakfast
GQ 2	You are living with other people. Did you ever experience somehow their actions or values or food practices influences your way in managing food at home? for example: I have an OCD housemate which frequently reorganize the fridge. I know her good intention, but sometimes it makes me to find my food hardly or to forget the food I have. How do you feel about that? if the example is negative, ask for positive! also the way around	a lot. He never cooks, his dad does that. Her parents teach him to have sustainable food practices
GQ 3	What do you think of food visibility at home?	like it. but depends on the kitchen interior. His parents house has more cupboards, but his brother has more open shelf. Showing food is okay, but the kitchen should keep clean and tidy

Consent Form

DESIGN AN INTERVENTION TO HELP REDUCING FOOD WASTE AT HOME

This research is conducted as part of the MSc study Industrial Design Engineering at TU Delft.

Students: Fauza Karomatul Masyhuroh
Contact person: Fauza, fauzakaromatulmasyhuroh@student.tudelft.nl , +31627917345

Informed consent participant

I participate in this research voluntarily.

I acknowledge that I received sufficient information and explanation about the research and that all my questions have been answered satisfactorily. I was given sufficient time to consent my participation. I can ask questions for further clarification at any moment during the research.

I am aware that this research consists of the following activities:

1. Filling out a Photo Diary for 5 days
2. A final interview after the photo diary

I am aware that data will be collected during the research, such as notes, photos, video and/or audio recordings. I give permission for collecting this data and for making photos, audio and/or video recordings during the research. Data will be processed and analysed anonymously (without your name or other identifiable information). The data will only be accessible to the research team and their TU Delft supervisors.

The photos, video and/or audio recordings will be used to support analysis of the collected data. The video recordings and photos can also be used to illustrate research findings in publications and presentations about the project.

I give permission for using photos and/or video recordings of my participation:
(select what applies for you)

- ☐ in which I am recognisable in publications and presentations about the project.
- ☐ in which I am not recognisable in publications and presentations about the project.
- ☐ for data analysis only and not for publications and presentations about the project.

I give permission to store the data for a maximum of 5 years after completion of this research and using it for educational and research purposes.

I acknowledge that no financial compensation will be provided for my participation in this research.

With my signature I acknowledge that I have read the provided information about the research and understand the nature of my participation. I understand that I am free to withdraw and stop participation in the research at any given time. I understand that I am not obliged to answer questions which I prefer not to answer and I can indicate this to the research team.

I will receive a copy of this consent form.

_____	_____
Last name	First name
___ / ___ / 2021	_____
Date (dd/mm/yyyy)	Signature

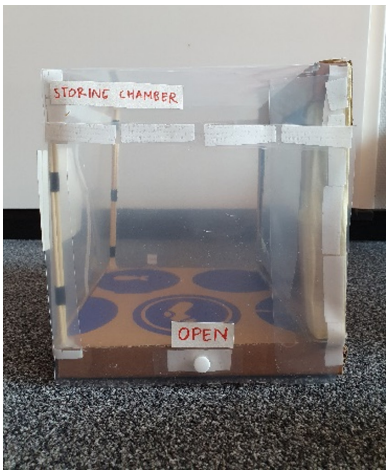
APPENDIX C

Prototype and User Test

Goals:
- To know what the users think and feel of replacing the cooling element regularly
- Durability of the cooling element (how long the cooling element can stand to cool the storage chamber)
- To know how the users interact with the "Normal chamber" (separating the ethylene producers and absorbers), what they feel and think about it
- To know how the users interact with the "Cool chamber", what they feel and think about it

Materials:
1. Normal Chamber: a transparent food display cabinet made of plastic, cardboard for the separator and guidebook holder, stickers clue, and a guidebook
2. Cool Chamber: cardboard for the base and cooling element compartment, a transparent plastic as the body and a cooling pack as the cooling element.

Conditions
- No insulation system for the Cool Chamber. Semi-intentional: hard to build a good insulation system without proper equipment and deliberately I want to know how the durability of the cooling element in a very poor insulation system (how the heat transfer works if I design the cooling element compartment on the side)



Testing Procedures:
1. The participant was given a set of food card which represents fruits, vegetables, and food leftovers to store in the food display cabinet.
2. The participant was asked to put the food card away
3. Explained what the product is and the context of when and where to use it, also the product purpose
4. The volunteer was asked to experience inserting the cold pack (cooling element) and taking out (ergonomic and convenience)

Observation and Interview

PARTICIPANT 1: lazy person, less organized, like the way it is
Observation:
1. Did the participant read the manual? Why?
No. She noticed the guidebook, but as it says, "a guide for better storing", she ignored it. She thought the book is only about guiding the user in how to store the food correctly and she thought she already knew about is like just open the cabinet and put the food inside. No special information. It is just a food cabinet, so she can store it without any guidance.

Advice: change the title -> more about the story why the product is designed this way. Talk a bit about sustainability is okay, just like Dopper does or Oatly on its package. Draw more pictures instead text only. Attach it on the box when the user buys it for the first time or somewhere in the product, but easy to read and notice.

2. How did they put the food card away? Did they follow the image/sticker clue? Why?
The participant was instructed to act like in a real life. She was given option to use the food display cabinet and any other storages she has, including the fridge. She only puts banana and tomato in the "room temp chamber/ normal room" since she knows that those items should not be refrigerated. She keeps sandwich and half-used apple in the "cool chamber" because she will consume it soon (fast grab). For most fruits, veggies and leftovers were stored in the fridge. The reasons:
a. Basically, she likes cool fruits to eat because it feels more refreshing.
b. She does not know that much about which fruits or veggies that should be stored outside the fridge.
c. She always uses fridge to store everything (habit).

For the jam, she will utilize a jar to contain it.
Stickers on the lid: she did not notice it when opening the lid. But then she saw it after closing it. That is also the reason she only put two items in the Normal Chamber.
Comment for each chamber:
a. The Normal Chamber (room temp/low ethylene)
• The lid: she did not notice the stickers. The fruits and vegetables shown on the stickers cannot represent food items that are consumed by people. It is too few. What about items that are not there (not shown on the sticker), how the user is supposed to store it?
Term "ethylene producer and absorber" is unfamiliar for people. Grouping the fruits and veggies based on this parameter will be difficult for the user to understand. If the goal is to educate them, use easier words to explain. Even though the product is still using this language, there should a bridging information (should be noticeable and easy to understand)

Advice: search more fruits and veggies that are commonly consumed by people. Create a pamphlet to show those items. Think of how to deliver the knowledge in more understandable way.

• Separation feature:
The participant doubts its function. What the difference if she uses two bowls instead of this cabinet (Normal Chamber)? Since there are more a lot of various fruits and veggies to store, eventually the separation may be useless. I told her that there are some items that do not produce or are not sensitive to ethylene, then she asks, "what about those items as well?". It could be a bit confusing.

Advice: tell the added value clearly, through the design.

• Guidebook: too much text, prefer with images. The name does not match the content.
Advice: Change the title, add more illustration or pictures. Create a story of the product. Why this product worth to buy and its contribution in achieving sustainability.

• The size, shape, material: no problem with the material, shape is also okay, but the size is rather small to store many things.

b. The Cool Chamber
• The lid, including the sticker: the participant feels that the door is inconvenient to put and take the food. Difficult to access food in the corner or far from the door. The sticker should be more visible in the front and should cover more food.

Advice: instead front, design a top door, i.e. the user accesses the Cool Chamber from top (but it also depends on where the product will be placed -> if it becomes too high, it could be hassle). For the sticker: instead of mentioning each name of food, it could be better to write a group name (meal leftover, half-used veggies, half-cut fruits, etc).

• Cooling element compartment: she was given two cooling elements to insert. The compartment was designed for two cooling elements. She prefers to have it transparent because she likes to see the technology inside. Moreover, it helps her to see the first cooling element position and create some space for the second cooling element quickly (her fingers could be freezing if holding the cooling elements too long).

• The shape, size, material: the material should be rigid or firm to create a good insulation. Size: should be bigger than now if it is intended to store food leftovers. People usually use bowl or plate to keep leftovers, so the Cool Chamber must be able to accommodate it. Then I offered an idea of providing special compartments in the Cool Chamber as the leftover's container, she replied "it's fine, but what if the amount of the leftover is more than the container can handle?
Shape: she does not want to mix fruits with leftover or sandwich because the fruit smell may contaminate other food. The flavor may change and become unwanted. In the fridge, she can arrange them in the different section or give a distance or use a plastic wrap to prevent smell contamination.

Advice: creates at least two parts to separate meal leftovers and half-used fruit or ingredients. The shape should make convenient way to insert and take the food.

• General comments: write a clear function of both chambers, added values, and its position in the food storing system at home. How much the Cool Chamber can cool the room? The lowest temp? -> the temp info should be shown explicitly to convince the users or give a picture of the product usability. How long it can maintain the cool?

She perceives the product "cool chamber" as a temporary chiller because it uses a manual cooling element. If she went back from shopping, she would put most fresh groceries in the fridge because she stores the food for a long time. Only food that she needs to grab quickly, or half-used fruits might be put in the Cool Chamber. However, as she just cooks once a week, she prefers to keep half-used ingredients in the fridge to ensure its freshness. She was afraid that she forgets to replace the cooling element if she stores it in the Cool Chamber.

3. How did they insert the cooling element?
As she could not see through the compartment, she faced a bit hard to fit both cooling elements into the compartment

Interview:
1. How do you experience using the product?
Cool Chamber is fascinating, so cool. She feels having a new toy. Even though sooner or later she might get bored and still use it or leave it if it becomes demanding. But the Normal Chamber is not any special. It is just a common food storage, like putting the food in the cupboard.

2. What do you feel about changing the cooling element regularly?
How long the cooling system work for one cycle? Without replacing the cooling element.
Intention: once a day, during the dinner time. There will be two sets of cooling element: one to use and another as a spare. So, during the replacement time, the user just uses the frozen spare and freeze the used one.
If it is only once a day, then it is fine. Yet, if it is more, she feels too lazy or burdened, especially if she must memorize or remember when she should replace the cooling element. She wants to know exactly the time she must replace the cooling element (when the cooling element melts down). Does the environment/room temperature influence the effectiveness of the cooling system? It may depend on the insulation system, the better the system, the effect might be less.

She has no scheduled daily dinner time. So, if the replacement relies on the dinner time, it is not preferable.

Advice: search how the existing product is doing -> how long the cooling element can cool a room stably.

What do you think the best reminder for you to change it?
Depending on the task priority at that time, she may follow or ignore it. However, eventually, if she has to be reminded every day, she thinks it would be better to store it in the fridge.

Its accessibility?
As her fingers are small and the cooling element has a lid, so it was easy to take it out. If the hand is bigger, it may a bit difficult to reach the cooling element.

Advice: the cooling element has a special container with a holder to insert and take it out conveniently.

3. What do you think of the stickers? Both in the Normal and Cool Chamber
If there is a compartment in the Cool Chamber, people may get the general idea to separate food at least between sweet and salty to avoid mixed flavor contamination.

Who is the target market? People who are aware of sustainability or people who want to have a fancy storage. How to design the product as general as possible, for example if she has to separate the food, she will automatically think of vegetables and fruits group. If the ethylene thing underlies the separation system, it should be written in the guidebook (list of food to store and how). More compartments, not only two options (less freedom to store). The guidebook should have an intriguing color and drawings. Actually, if the target users are consumers who concern of sustainability or the product has a hashtag that addresses certain group of people, when they buy the product, they are conscious of the benefits and values, hence the probability to read the guidebook is high (curiosity about what the product can do). But if the function is only for saving fruits or vegetables, people may not feel interested to use it.
Stickers -> name of food group. Maybe you can find the pattern or special characteristic of ethylene producers and absorbers, then create a cluster that easier to understand by the users. Become more general, not remembering each name of food items.

4. What about the size?
If the house size is like TSH 20m2, she will not buy it. She feels there is no space for the product. However, if the product is aimed for a family who living in a big house (not apartment or studio), the size is too small to accommodate many leftovers. In the end, the users may put it in the fridge. At least the Cool Chamber size can handle several plates because the house member is more than one. Design the product should estimate how many fruits or veggies it can be stored.

PARTICIPANT 2: organized person, high curiosity, detailed
Observation:
1. Did the participant read the manual? Why?
No, but she saw it there. She was a bit nervous because she felt being watched by me. She became in hurry and skipped it. Generally, she will read a guidebook of the product she bought as she wants to know what the product is capable of and to optimize its usability and functionality.

Advice: during the observation or test, say to the participant to act as usually they do at home. No hurry, no wrong and right answer.

2. How did they put the food card away? Did they follow the image/sticker clue? Why?
She stored the food card based on her instinct and knowledge she had. She said that she saw the stickers but did not follow the stickers. However, sometimes the observer saw her glanced at the stickers a few times. This means she might notice the stickers presence which subconsciously guided her how to arrange stuffs in the Normal and Cool Cabinet, specifically when she hesitated where to keep certain items like paprika, eggplant. Food in the Normal Cabinet: section 1 (eggplant, avocado, mango) and section 2 (paprika, half paprika, tomato, banana). She was confused where to keep the cucumber. As she felt that cucumber is watery, she believes it should be stored in the fridge to keep the water fresh. Other items stored in the fridge are half lettuce and jam. Then, she put apple, half apple, pasta leftover and sandwich in the Cool Chamber. She said that she prefers to store pasta in the cabinet as usually she gets it frozen or too cold in the refrigerator. Also, to remind her that she has that food. She often forgets her leftover or those food are hidden in the fridge.

Comment for each chamber:
a. The Normal Chamber (room temp/low ethylene)
- The lid, stickers: the sticker is nice. It is just there.
- Separation feature:
- Guidebook: she noticed it but did not read it (already explained above). Usually she reads every manual book or guidebook of product she buys

- The size, shape, material: no comment.

c. The Cool Chamber
- The lid, including the sticker: she prefers to have a door like a fridge.
- Cooling element compartment: as she felt nervous, she did not explore the product in detail. Consequently, she missed the cooling element compartment. She did not see it until I showed it.

Advice: Move the sign "cooling compartment" from the side to the top to make it more visible. The product position during the test was on the floor and we sat next to it. We viewed it from top.
- The shape, size, material: in order to store more leftovers in the Cool Chamber, more compartments are required. A vertical compartment just like a refrigerator.

3. How did they insert the cooling element?
At first, she put the cooling elements inside the Cooling Chamber because she did not see the cooling element compartment. After she was told, she moved it. It was easy for her to insert the cooling elements.

Interview:
1. How do you experience using the product?
Normal Chamber: she felt nothing, she may not need it as she seldom purchases fruits.
Cool Chamber: She likes and needs this chamber over the Normal Chamber. She can store meal leftovers more convenient, not too cold (if kept in the fridge) and can see it to consume a day after. She perceives this chamber as a supporter of short-term storage (quick grab). But if she needs to keep food longer, she will opt for fridge (more reliable). She won't use this product daily if she has to change the cooling element regularly. Only when she feels that she needs to use it (when she has a certain purpose).

2. What do you feel about changing the cooling element regularly?
She will be forgotten for most of time.

What do you think the best reminder for you to change it?
She often goes outside until night, have a dinner outside.

Its accessibility?
It was easy to take it out, with the help of the cooling element lid. But for bigger hand, it might be a bit difficult.

3. What about the size?
It fits well. But add more compartments to store more leftovers.

APPENDIX D

Experiment of a Lid Implementation to Extend Shelf Life and Ethylene Effect on mature tomato and banana

Purpose:
1) Effect of ethylene on fruit storing, 2) Lid effectiveness to help prolonging fruit shelf life

Tools and materials:
Bananas, tomatos, hygrometer + room thermometer, container, bowl

Procedures:
1) There are 4 treatments: banana alone in a bowl, banana alone in an enclosed container, banana + tomato in a bowl, banana + tomato in an enclosed container
2) Observe and take a note of the relative humidity, temp and fruit conditions for every 5 hours (take a photo)
3) Run the experiment for 5 days

Hypothesis:
banana with a tomato will be ripening faster than without tomatos, fruit without lid will get bad sooner

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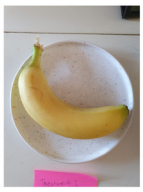

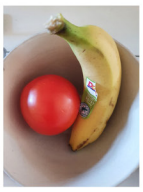

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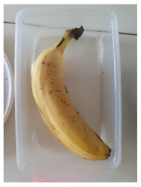
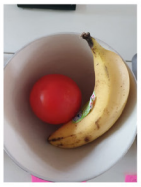
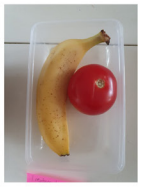

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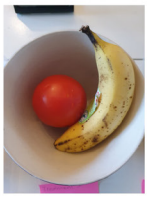
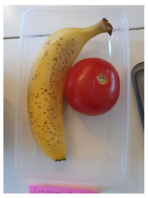

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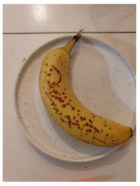

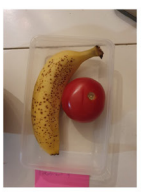

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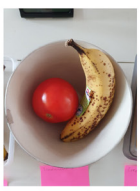

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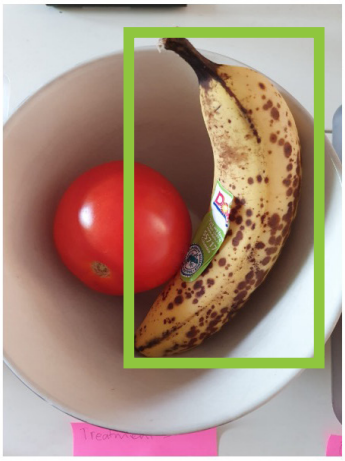
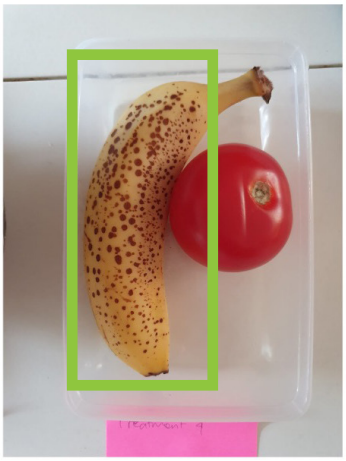



brown spots of banana in the bowl have larger size and number than banana inside the closed container. Banana in the bowl has brown tip as well.

bananas and tomato vs bananas alone

almost no difference spotted. it might be due to the fact that ripe bananas and tomatos produce medium amount of ethylene gas and less sensitive to ethylene, which then reduces the effect of ethylene gas in maturing process

bananas without lid vs bananas with lid

the main function of the lid is to retard the respiratory rate which continously happens even after the fruits and vegetables are plucked from the tree. Respiration uses oxygen in the air to break down stored sugar in the fruits and vegetable into CO2 and water. This process causes ageing called senescence, makes the fruits wrinkled or the vegetables withered, less fresh and dies eventually. In order to prolong the food life time, the O2 exposure should be reduced, which in this case is utilizing a lid. However, if the concentration of oxygen is too low, fermentation will occur. Fermentation converts carbohydrate to CO2 and alcohol which also promotes premature decay and yields unpleasant flavour. Proper control of the oxygen and carbon dioxide amount surroundings the food can decelerate the respiration rate (FIXME source yg kuning bryan). Therefore, in this experiment, there were two treatments to achieve that.

Firstly, regular opening-closing the lid, to replicate the user action when taking the commodity everyday. When the container is closed, the respiration gets slower due to limited concentration of the oxygen to react. Whereas, when the lid is opened, O2 enters the box, replacing CO2 and other produced gas inside, including little amount of ethylene and new respiration process happens and continous as long as there is oxygen. Secondly, the usage of a non air-tight container which creates loss in air flow (i.e. some oxygen may gets in and CO2 gets out). These treatments keep the O2 and CO2 at the proper level which slow down rate of the respiration but do not start the fermentation reaction.

From the pictures each day, the difference between bananas with the lid and without is noticable. Bananas in the open bowl creates more brown spots than the bananas stored in the enclosed container. This phenomenon proves that the lid worked quite well to fulfill its job.

By implementing this small change in handling fruits, the shelf life of bananas could be extended for one more day -> result of appearance comparison (visual analysis) between banana's condition at the same day and the other days. It is found that bananas presentation (amount of brown circles) on one day is similar to a day before.

APPENDIX E

"Experiment to display fruits and vegetables in an enclosed container"

Purpose:
1. to understand how I feel about having a special enclosed container to store some fruits and vegetables
2. to know how a simple container can maintain food quality

Tools and materials:
1. An enclosed container
2. Cabbage, cucumbers, limes, and tomatos.
3. Hygrometer

Day 1

I know that I should separate the food items by following the stickers, but I did not 100% obey it. I put cucumber and tomato in different room anyway.
The partition was bending because I needed a bigger space for the cabbage, but the wall is not movable. So I forced it a bit.

Day 2 and Day 3

All food items are okay. No damage spotted

Day 4

The limes got mold. The possible reason is the humidity inside the container increases. The cause is still questionable. Perhaps, the half-cut tomato is the trigger and a tight lid. The tomato water evaporated and rose water vapor in the air. Moreover, A tight lid prevent air flow from happening. As a consequence, the humidity became higher. As I did not know the cause at that time, I did not take any action to anticipate further damage.

Day 5

RH room

RH in the storing container

More molds were found on the half tomato surface (small white spots) and on the cabbage stem. Common knowledge that mold could grow due to high humidity. Relative humidity of my room is 60%. So I thought it is impossible for fungus to grow at this level. Therefore, RH inside storing container was measured. The result showed 99%. Then, it makes sense that mold appears.
It was shocking result. I did not expect that the RH will reach 99%. I open the container at least once a day. What more surprising was it only spent 5 hours for the RH to increase from 60% to 99%. Hence, opening the container once or twice a day might not be enough.

The exact reason is still questionable. It could be the half-cut tomato, or other food type that releasing certain gas or evaporating which trigger high humidity or it could be part of fermentation process. This could be the result of storing these kind of food more than 24 hours.

Questions:

1. How do you feel of storing these food in the container, instead of fridge?

I expected the food product quality will be fine outside the fridge because based on the research, these commodities should be stored above chilling temperature.

Finding mold on the food was a bit dissapointed and made me wonder why.

When I noticed it the first time, I felt okay. But after the second time, I doubt the product. I become afraid to put my food there.

Storing half cut tomato in the fridge causes the surface dry. However, this seems better than being moldy because I have to cut some part and throw it away.

2. What do you feel to interact with the product during cooking? accessing the product

I located the container quite far from the kitchen counter. I must walk a bit to take the food. However, it was not bothering at all because I only had to open the lid, took the food out and closed it. Usually I took the food during preparation, not in the middle of "risky" step in cooking.

3. How do you feel to take the food and return some half–cut to the container?

I did not feel any special thing. It is the same with returning some ingredients back to the fridge.

Conclusion:

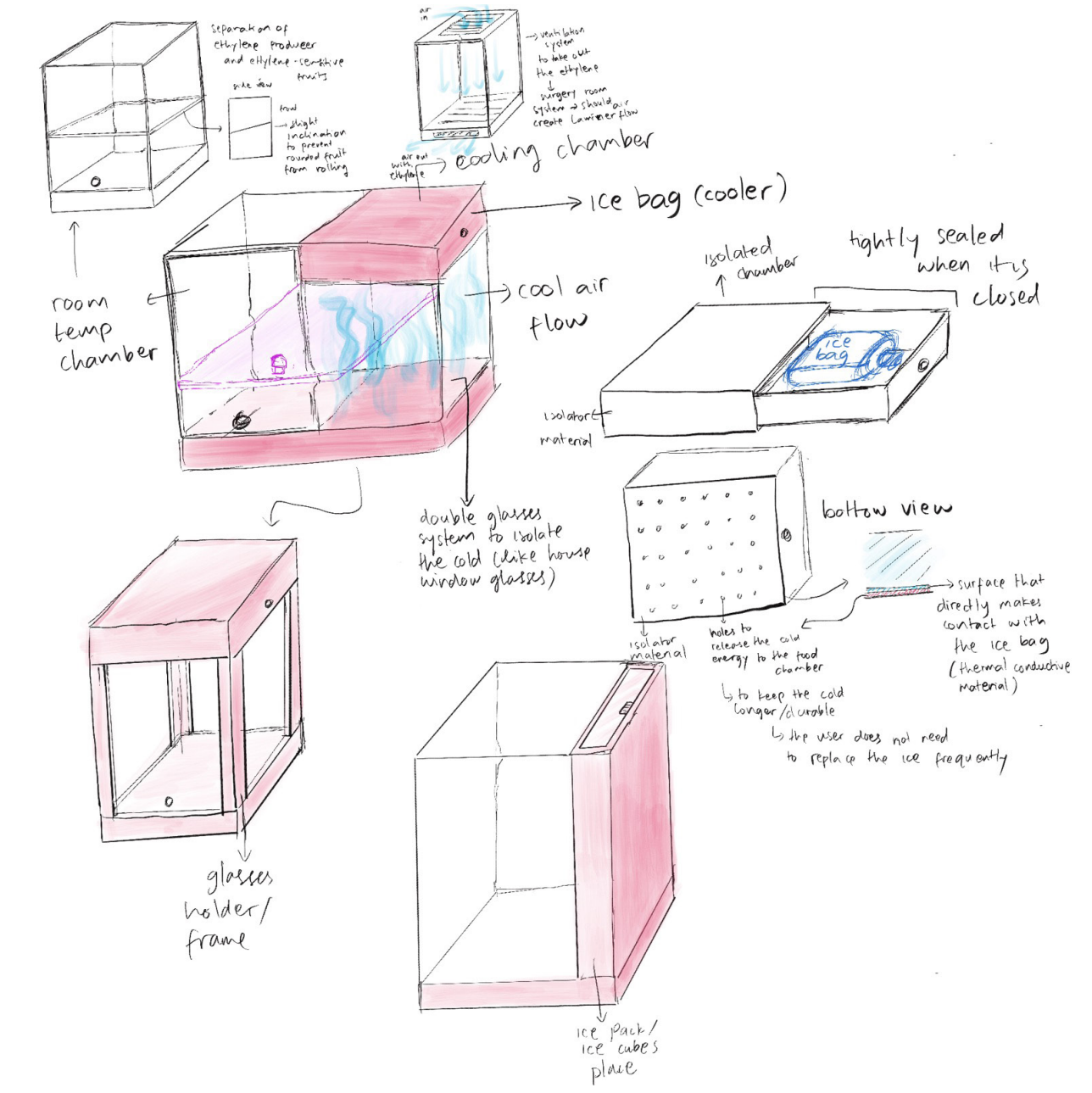
Relation with the final product design:

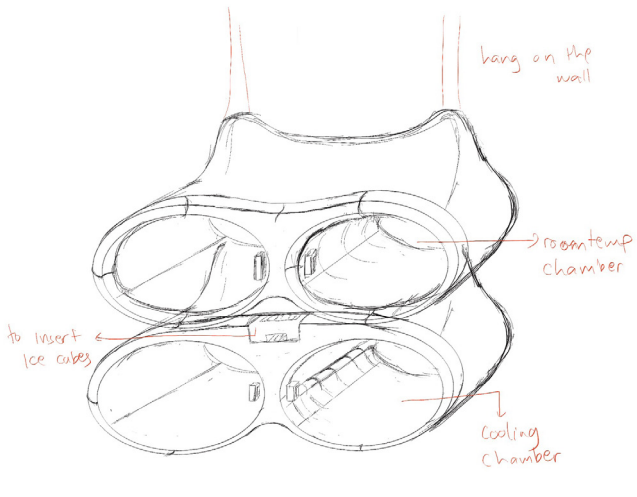
1. Opening-closing an air tight container once or twice a day seems does not enough to anticipate some damage to the fruits and vegetables, especially if there is half-cut items and watery. Another method to regulate RH might be crucial.

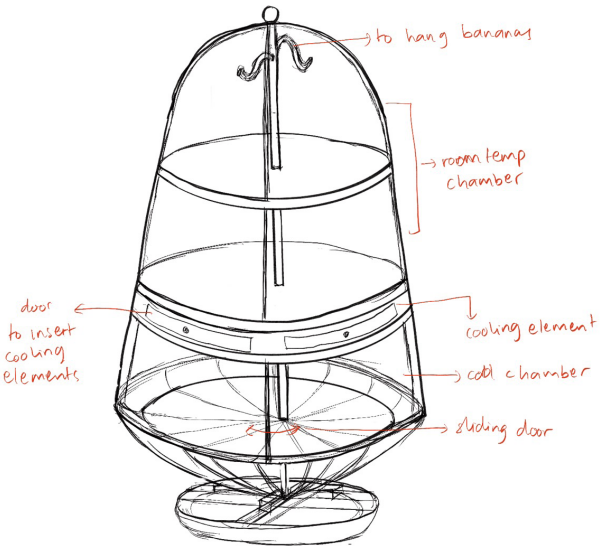
2. In communicating its function, it must be clear if FooDi's purpose is keeping fruits and vegetables only for 24 hours. In this case, the cooling room might not necessary anymore. If the user knows that the product has a cooling system, they may not finish the food within a day. Cooling system creates a perception of storing longer.

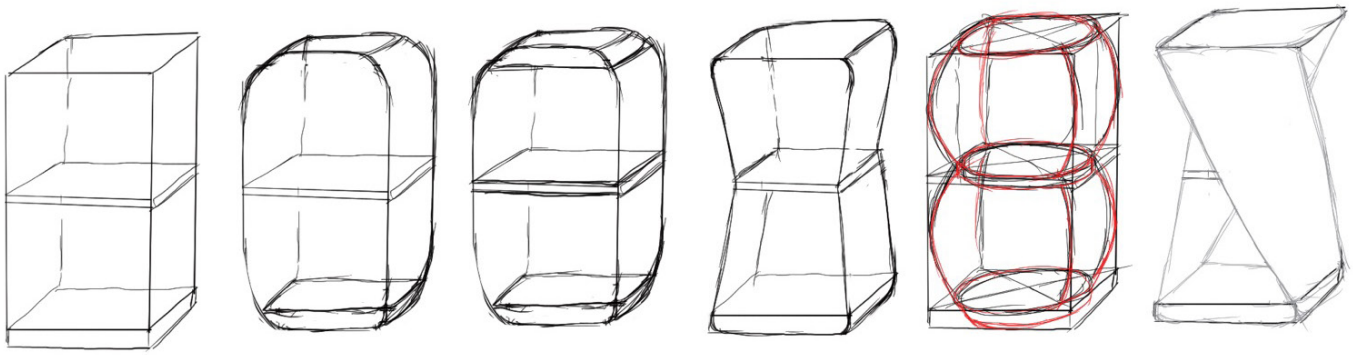
APPENDIX F

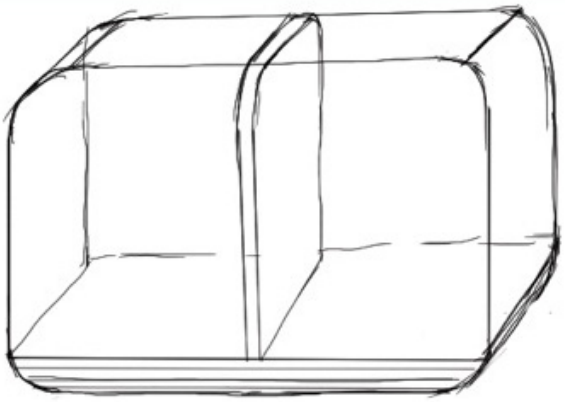
Form Exploration

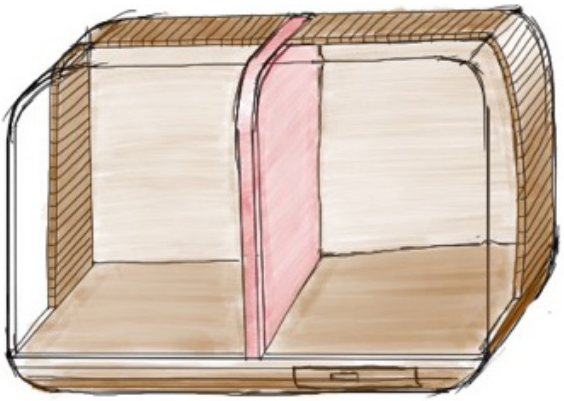


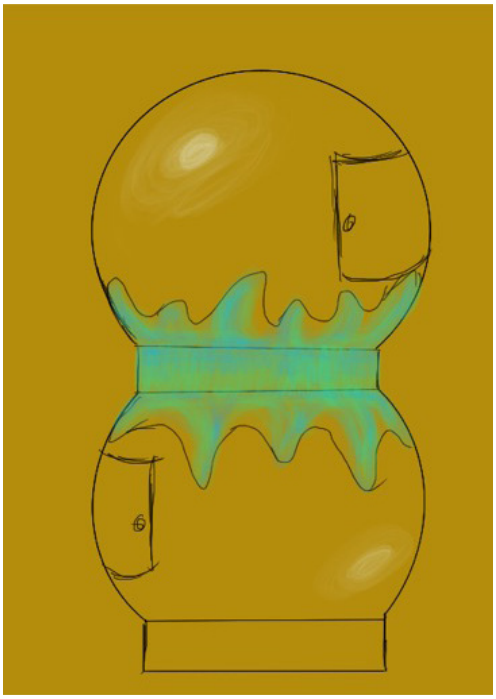


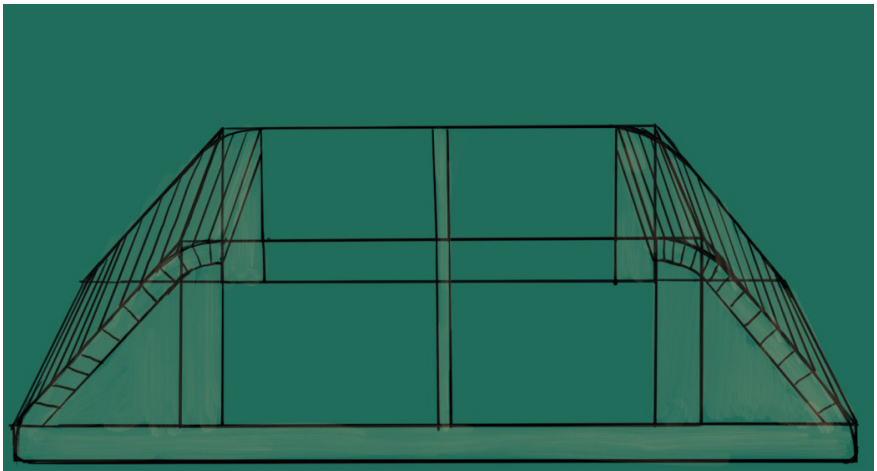


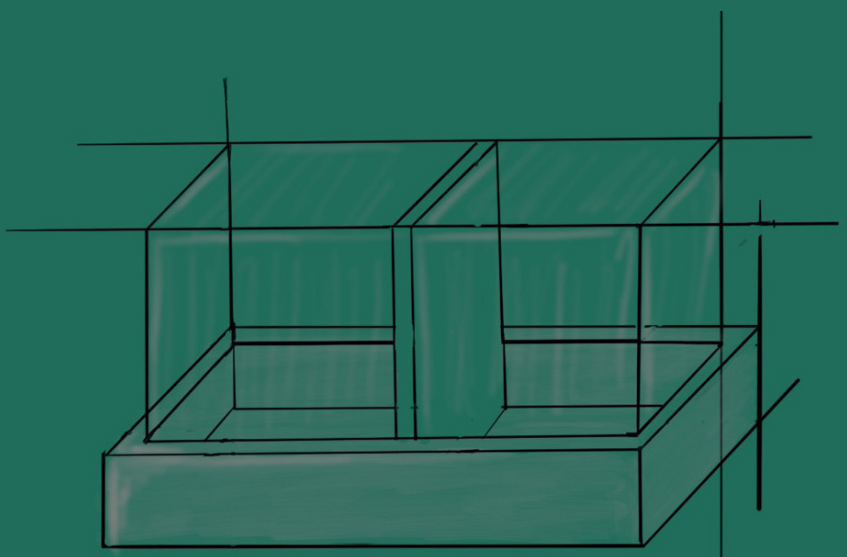


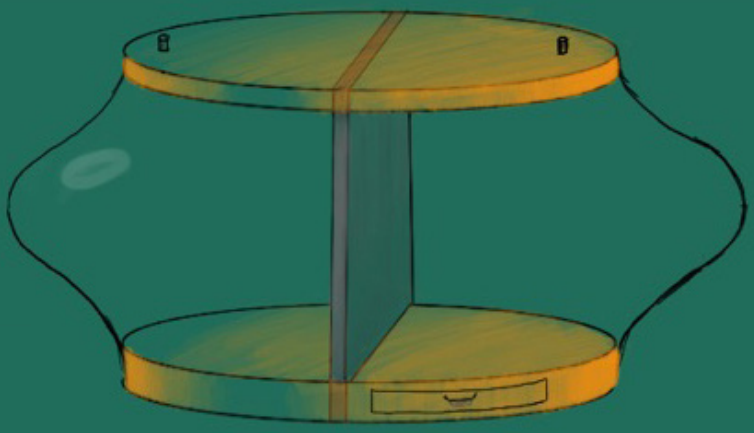


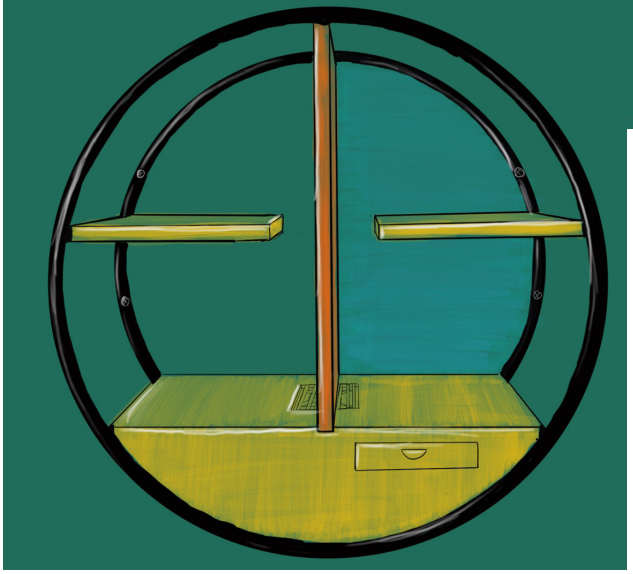












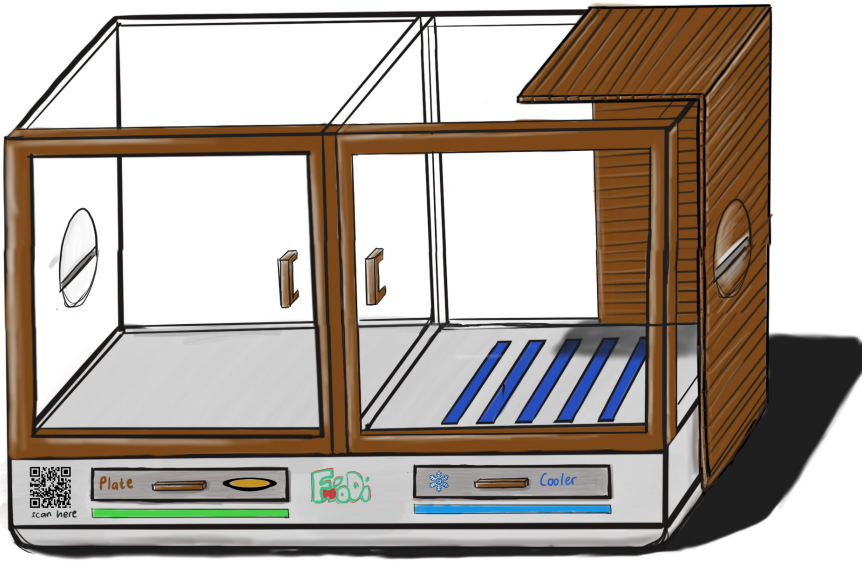
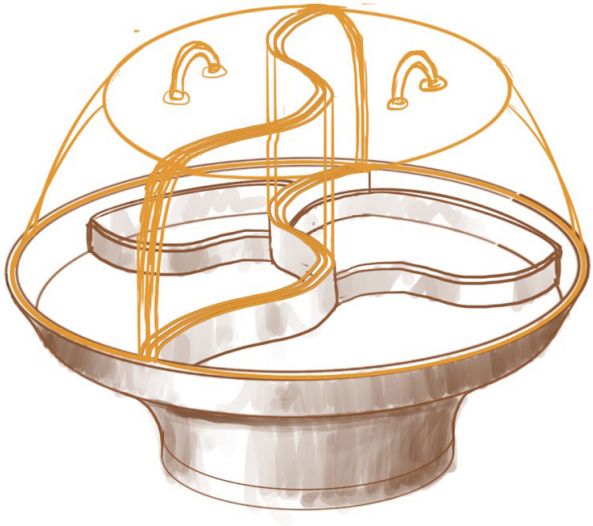
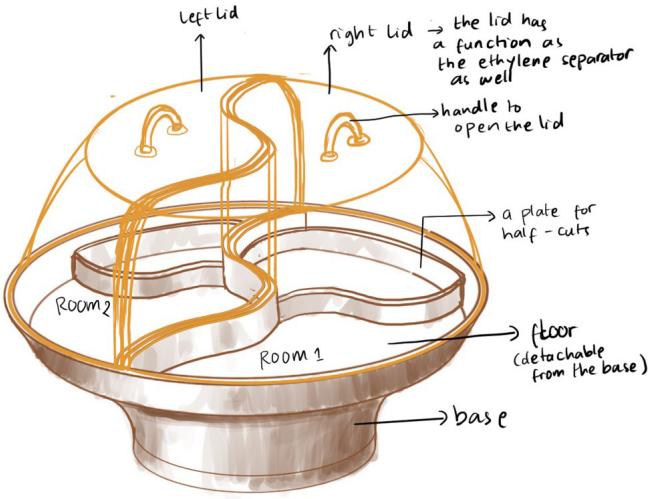
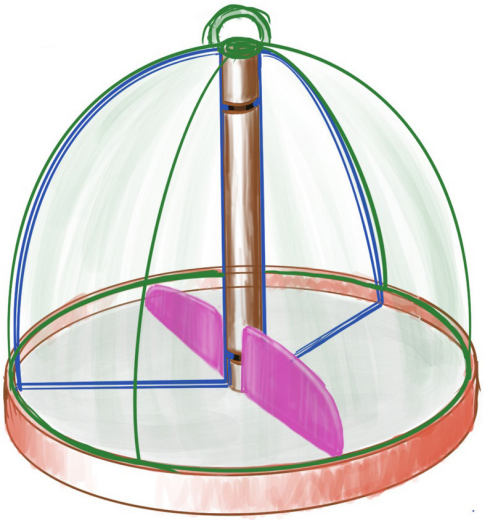
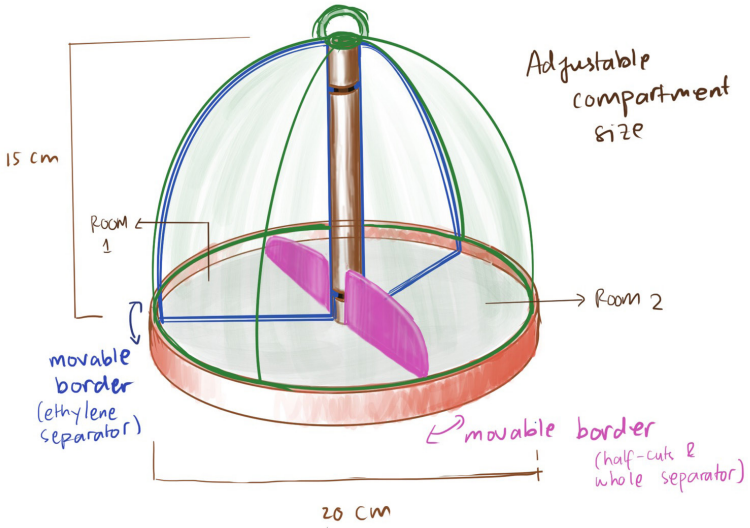


Plate
scan here
Cooler




Left lid
right lid → the lid has a function as the ethylene separator as well
handle to open the lid
a plate for half-cuts
Room 2
Room 1
floor (detachable from the base)
base




Adjustable compartment size
15 cm
ROOM 1
Room 2
movable border (ethylene separator)
movable border (half-cuts & whole separator)
20 cm

APPENDIX G

DESIGN FOR our future

TU Delft

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements mace between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name	Masyhuroh 4924
initials	FK given name Fauza Karomatul
student number	4775880
street & no.	
zipcode & city	
country	
phone	
email	

Your master programme (only select the options that apply to you):

IDE master(s): ★ IPD ( ) DfI ( ) SPD

2nd non-IDE master:

individual programme: - - (give date of approval)

honours programme: ( ) Honours Programme Master

specialisation / annotation: ( ) Medisign ( ) Tech. in Sustainable Design ( ) Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair	Henk Kuipers	dept. / section:	ID/Applied Ergonomics
** mentor	Hannah Goss	dept. / section:	ID/Design Aesthetics
2nd mentor			
organisation:			
city:		country:	

comments (optional)

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Henk Kuipers date 08 - 04 - 2021 signature Hkuipers Digitally signed by Hkuipers Date: 2021.04.08 13:38:39 +02'00'

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: 3 EC

Of which, taking the conditional requirements into account, can be part of the exam programme - EC

List of electives obtained before the third semester without approval of the BoE

★ YES all 1st year master courses passed

NO missing 1st year master courses are:

name C. van der Bunt date 16 - 04 - 2021 signature C. van der Bunt Digitally signed by C. van der Bunt Date: 2021.04.16 15:58:11 +02'00'

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: ★ APPROVED NOT APPROVED

Procedure: ★ APPROVED NOT APPROVED

- in title households with a s
- planning should be 20 weeks instead of 23 weeks (because there are activities in the 0 weeks)

comments

name Monique von Morgen date 28 - 04 - 2021 signature

Initials & Name FK Masyhuroh 4924 Student number 4775880

Title of Project Design interventions to prevent daily food waste at Dutch household

Design interventions to prevent daily food waste at Dutch household — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 01 - 04 - 2021 — 27 - 08 - 2021 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

The Netherlands Nutrition Centre reveals that the quantity of food waste in the Netherlands in 2015 was between 1.77 and 2.55 billion kg, which 33% of it is contributed by households. Each year, the Dutch consumer wastes approximately 41 kilos of solid waste (all types of food excluding beverages), reflecting 13% of the food that is purchased in vain (see Fig 1). Even worse, the major part (54%) of household's food waste is categorized as avoidable, which means that edible food or food purchased and cooked with the purpose of human consumption remains uneaten and is discarded.

Food waste in households concentrate on two aspects: the accumulation of food items that are never prepared for consumption (overconsumption) and disposed of when they reach their use-by date; and the 'leftovers' from prepared meals that make their way, often indirectly, into the bin (Evans, 2012). Four main factors that influence consumers ending up to waste food are attitudinal factors, external forces, personal capabilities and habit or routine (Farr-Wharton et al., 2014).

Attitudinal factors show our internal motivation to be a "good provider" for families and convenience by always preserving abundant and healthy food. External forces which affect consumer's behaviour are low food cost, discount, marketing, and advertisement. Personal capability explains lack of knowledge and skill in food management such as proper storage or food preparation. Routine refers to daily habits or practices which could lead to waste food, for example impulsive purchasing and having no willingness to consume leftover anymore. Without proper interventions into these factors and implement better household food management, amount of food waste could be hardly reduced.

Food waste is a wicked problem which not only causes environmental deterioration, but also socio-economic food gap. The environmental burden of food production for consumption in the Netherlands is 229 ReCiPe points per person (land use, greenhouse gases and energy consumption combined). In the EU level, disposing 89 million tons of food waste per year, consumes 261 million tons of resources which is equal to 170 million tons of CO2 emission (FAO, 2013). Furthermore, social gap issue in food between hunger and wasting food is also rising. 184kg avoidable food waste per year in Europe should be sufficient to feed approximately 200 million hungry people in Africa (FAO, 2011). Due to these massive problems, combatting food waste becomes urgent to solve.

The Ministry of Agriculture, Nature and Food Quality of the Netherlands has endorsed one of the objectives of the UN Sustainable Development Goals (SDG 12.3), which is halving per capita food waste by consumers and supermarkets by 2030 compared to 2015. Even though, there is downward pattern of the production of household food waste, from 48kg per person per year in 2010 to 34.3kg per person per year in 2019, more innovative and effective interventions are still needed to achieve the goal.

space available for images / figures on next page

introduction (continued): space for images

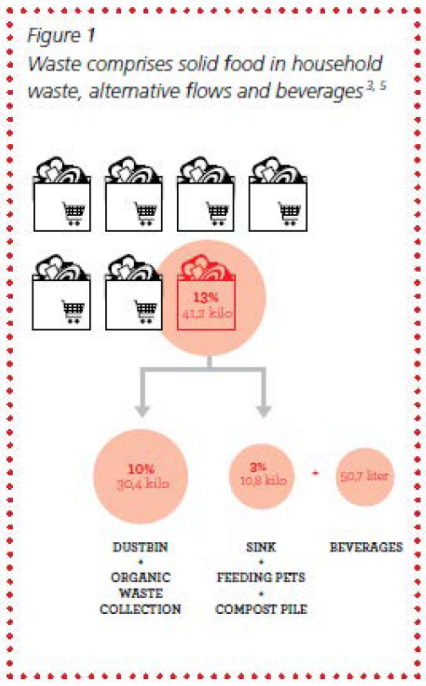


image / figure 1: Waste comprises solid food in household waste

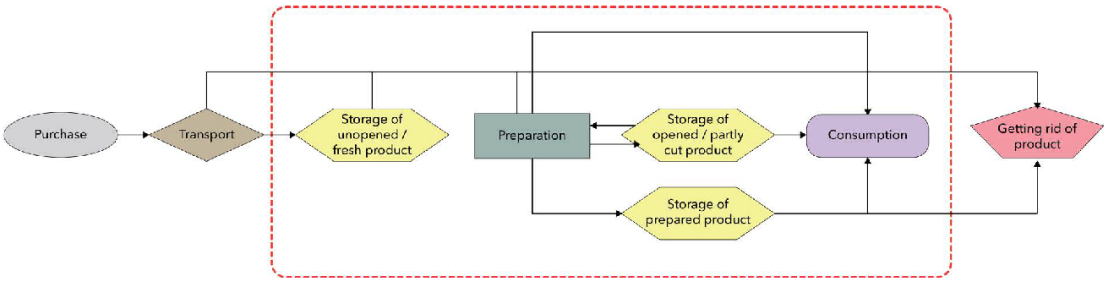


image / figure 2: Food handling, food production and risk during domestic food preparation, Terpstra, M. J., 2005.

Initials & Name FK Masyhuroh 4924 Student number 4775880

Title of Project Design interventions to prevent daily food waste at Dutch household

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

Almost all Dutch people (93%) are already aware of high amount of food waste in the Netherlands and 90% of them are willing to reduce food waste. However, in practice, it is hard to achieve. In reality consumers are faced with several obstacles in preventing food waste, including buying or preparing too much of a specific product, incorrect storage habits and having low skill and knowledge in managing leftovers. These issues are result of low or bad household food management which consists of planning, shopping, storing, preparing, and consuming/eating (see Fig 2). Various practices in each stage might contribute to slowing down food waste reduction progress.

A lot of studies and efforts already put to reduce food waste at consumption level. However, most discourses about food waste in consumption level present it as a personal issue to be resolved (Southerton, 2016). Therefore, the common proposed intervention is like either by voluntary lifestyle changes or regulation to guide those food choices (e.g. sustainable campaigns aimed at encouraging greater use of leftovers or information on how to reduce food waste). Since Dutch people already know the urgency of reducing food waste, deeper penetration might be necessary to help them prevent their daily food waste.

This project will focus on inquiring daily food practices of people by applying social practices theory. The theory comprises of three interconnected elements: stuff, skill and image, related to food practices. By analysing these aspects, it might not only reveal which consumer food practices lead to food waste production, but also existing practices which help preventing food waste. Moreover, use these insight and aspiration as a basis to develop design interventions which can catalyse more effective change, also finally, food waste at Dutch household level can be reduced.

Fig 2 shows the scope that this project will address. Food practices of Dutch culture will be inquired as target practices.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

Main goal of this graduation project is to develop a design intervention around food practices in a form of a product/service which help preventing food waste at Dutch household

Research question that will be addressed:
1. What practices exist in different cultures that help reusing or saving food (prevent food waste generation)?
2. What can the Dutch learn from these practices to help them waste less food?
3. What is needed to adopt these practices in Dutch culture?

During the research phase, there are three aspects to be analysed. First, 'stuff' which is things or artefacts that support target practices (e.g. microwave, refrigerator, utensils, etc). Second is 'image', meaning or emotion related to food practices (e.g. eat vegetable to be healthy). And third is 'skill', the people ability to do the practices (e.g. cooking skill and knowledge). By analysing them, it will help identifying constraints and opportunities regarding food practices at household level and utilize those to generate innovative design intervention for Dutch household culture, to prevent food waste.

The outcome of this project is a tangible product and/or service which supports building upon desirable food practices regarding food waste prevention at Dutch household. This means the solution direction which is a result of social practices theory (comprises of cross-cultural and historical analysis), should be well implementable in the Dutch culture context, easy to adopt, and enhance consumer's ability to prevent food waste production in their home.

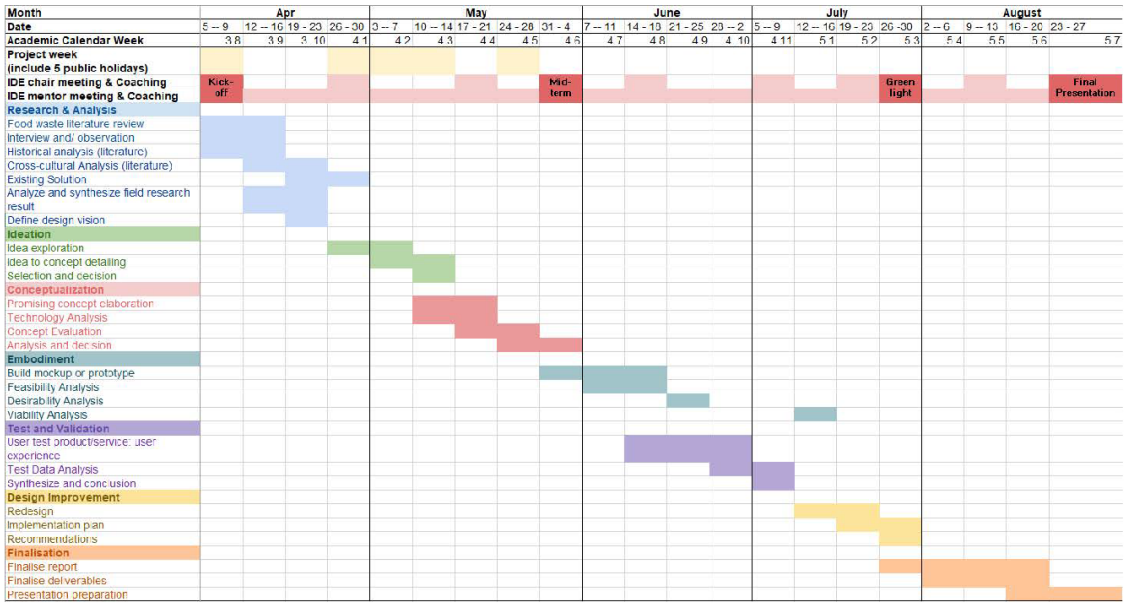
Initials & Name FK Masyhuroh 4924 Student number 4775880

Title of Project Design interventions to prevent daily food waste at Dutch household

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 1 - 4 - 2021 27 - 8 - 2021 end date



There are three main phases that will be executed in this graduation project. In order to reveal any practices which might influence food waste generation and prevention at Dutch household, literature review and interview method will be utilized. In practice, this might be combined with observation to capture daily food practices, also stuffs belong to target user research which support their practices. In order to understand other cultures, the same method will be also applied to talk with foreigners who are living in the Netherlands, so it will not be too hard to find people.
Insight and inspiration from desktop and field research are used to find pain points and generate innovative ideas and concepts. After the concept reached a certain concrete level, it will be evaluated with the target users, which hopefully are the same people as when doing user research and even more samples.

Initials & Name FK Masyhuroh 4924 Student number 4775880

Title of Project Design interventions to prevent daily food waste at Dutch household

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

I personally choose food sector because I love to cook, different food rituals, various food, which then trigger my curiosity to design something which contribute to a better food system. I also concern on environmental aspect of any product and how to create a better or more sustainable world. A course called Strategic Sustainable Product makes me realize that designing resilient and sustainable products is not easy. It is full of trade-offs to take. Furthermore, the course Food and Eating Design made me understand that food is a complex system and contributes quite highly to environmental deterioration, like food waste. Hence, I would like to explore and experience myself in helping the earth and express my interest in food by doing this thesis project.

my ambitions:
1. Implement design theory and methodology to solve issues in the food system sector
2. Improve technical skills to translate abstract ideas into concrete product/service
3. Sustainable design: learn how to balance or determine a good trade off from applying sustainability aspect in a product/service
4. Enhance knowledge in using cultural approach to identify user's needs and define problems, also to help creating solution in a form of product/service

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

Initials & Name FK Masyhuroh 4924 Student number 4775880

Title of Project Design interventions to prevent daily food waste at Dutch household