

# A systemic approach to root causes of food waste

AND WHAT DESIGN CAN ADD TO FOOD AND HEALTH EDUCATION

By Fredrik Hope Knutsen  
Product design, OsloMet / May 2022

# ABSTRACT - ENGLISH

This thesis is written as part of the Master's program in Product Design at Oslo Metropolitan University in spring 2022. The thesis investigates the households behaviours towards food waste of edible food. As it takes a systemic approach combined with behavioral model such as the comprehensive action determination model to understand the relationship between the influence in our behavior. As it takes a deep dive into how food waste occurs and why, with tools such as giga mapping its taking an approach to understand how aspects such as, uncertainty, food value, consumer life situation, unfamiliar food in our routines and knowledge affect our behaviour. As it investigates how we can improve knowledge that is lost to the younger generation, but the elderly generation possess - the ability to assess if food is still edible. The solution looks into how the school can be used as a platform to influence habits within food practice in the short and long term. Based on findings it has been suggested to develop a platform where teachers can use a framework for their class, as this is a solution made

for food and health teachers, and other teachers in school. As the solution touches the three interdisciplinary themes that are integrated into the the curriculum, this is prioritised because they touch on key societal challenges that are relevant over time. The teaching material is focusing on how we can increase an individual threshold of acceptance. This is by creating good experience around food that we view as unwanted.

*Keywords: Food waste, Systemic design, Behavioral design, Experience design, Food and health education, Education framework.*

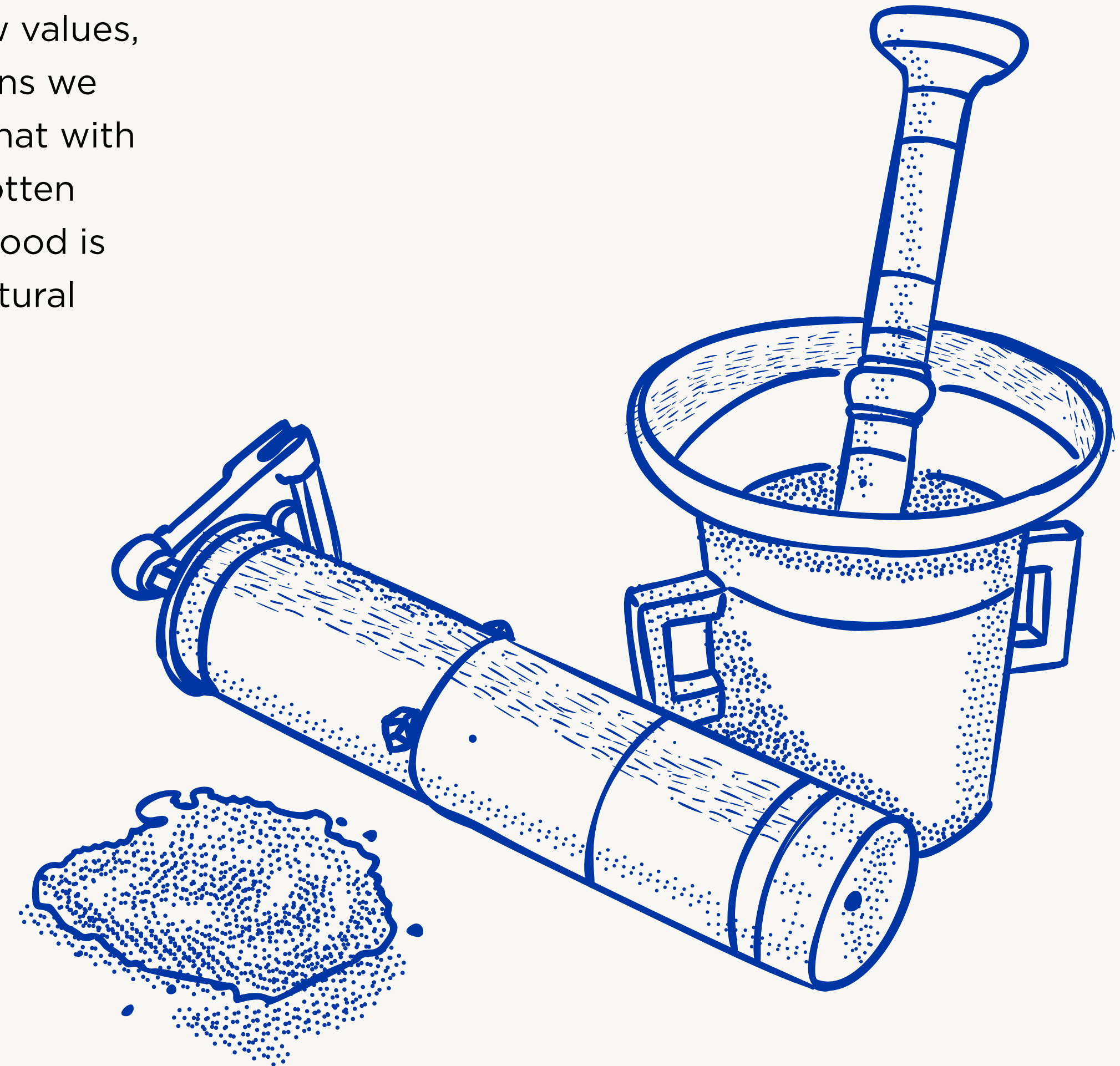


# PREFACE

It is fascinating how food bonds us together, this applies to everything from culture, nutrition, environment and how we bond over food. Throughout the history we have been sharing food and it's a language that connects us all. It does not matter if we speak Norwegian, English, or Spanish, we can cook something that we all can enjoy. Throughout the history we have been sharing food and recipes as a sign of friendship or pact (Siazon, 2022).

Since I was little my curiosity has pushed me towards how we can cook together, and how we can combine ingredients. The reasons for why I have chosen to work with reducing food waste in households is about several things. While growing up it has been important to eat or use up our leftovers as its shameful to waste valuable food. As well as my previously work and experience has provided my with insight into how we perceive food and how it connects us. In my pre-project, I studied how we can use mobile applications as a tool to create better control over our kitchen.

This was due to the reason people lack the ability to plan and keep control on what they possess in the households. In this thesis I look at what makes us as individuals waste food, how values, habits, and attitudes influence the actions we take and how can we possible change that with a systematic design approach. I have gotten to an understanding that how we view food is determined by individual, social and cultural factors.



# ACKNOWLEDGEMENT

I would like to thank Kristin Støren Wigum for being my main supervisor, guiding me on systemic design and highlighting what I should focus on. I would like to thank Marie Hebrok for being my secondary supervisor and providing me with information from her previous work on food waste and good discussion that has open my perspective on struggles and opportunities. I would also like to thank friends and family for support, and big thank to my flatmate for listing to me.



# TABLE OF CONTENT

## 1 PROCESS AND APPROACH

- » Introduction
- » Research question
- » Approach
- » Process
- » Methods
- » Theoretical background
- » What is behaviour? Why should designers use behavioural science?
- » System thinking - (GIGAMAP)
- » Research ethics

## 2 RESEARCH BACKGROUND

- » What is the problem?
- » What is food waste?
- » Sustainable Development Goals
- » What are the consequences?

## 3 REASON FOR FOOD WASTE

- » The unfamiliar food
- » Consumer Lifestyles
- » Value of food
- » Uncertainty, how does it affect us
- » Existing tools for food waste reduction on a consumer level and why they fail?
- » Knowledge - what knowledge do we need?
- » “Expert system” - What has happened to our senses?
- » Do we know what shelf life is?
- » Our behavior
- » So which senses do we use while cooking?
- » Key insights summary
- » Reflection

## 4 IMPLICATIONS FOR KNOWLEDGE ENHANCEMENT

- » Interview methods
- » What is food and health classes?
- » Food and health - what can it add
- » Interviews with teachers
- » How can children learn when subject teachers are not qualified?
- » Food and health classes is under prioritised
- » Worries around food and health
- » Interview with “bli matredder”
- » What type of learning is the focus today?
- » What resources do teachers have?
- » What’s good about the subject?
- » Key insights summary
- » Reflection

## 5 SOLUTION

- » Must - Should - Opportunities
- » Medium of the solution
- » The two parts of learning by doing
- » User journey of the experience
- » What changes does this create?
- » Website
- » Sense form - what is it?

## 6 CONCLUSION

- » Discussion
- » Conclusion

**P.6**

# **Chapter 1**

–

**Process and approach**

# INTRODUCTION

This project focuses on what food waste is and what causes us to waste food. With a systemic design approach to the task, it offers new perspectives to the field and thoughts around why we waste food as consumers. As the project progresses, an understanding is that young people today lack many of the capabilities, they are either expected to have or should have to assess the edibility of food. It turns out that many of the reasons for food waste are being created in households comes from a lack of knowledge. Here we look further at how to change these habits and intentions that we have built into the attitudes of our behavioral system. As these problems are more often seen in young people, the focus is on how to change the root of the problem. By adding competence on how to assess food sustainability at an early stage, it will help to create short and long term effects. The Norwegian primary school has been chosen as a platform, as this is an arena that reaches out to the majority of today's youth. Primary school has already implemented the subject of food and health into their curriculum, which already emphasis sustainable development. Therefor it studies the opportunities at how

educational framework can be strengthened and organised better for teachers. In this project the target group is therefore food and health teachers, with the intention of creating short and long lasting effects that influence food practices in households in a sustainable way.



**RESEARCH QUESTION**

**How can design influence how people assess the edibility of food through their senses?**



## APPROACH

In this project, I have used my background in product design and service design, with a user-centered design and systemic design perspective with a approach from behavioral design to create a deeper understanding of the user and their actions.

is a design methodology, which has become a reference tool for millions. This due to the common perception that design is not a linear model, where following the design methodology from A to B guarantees results (Knutsen, 2021). As mentioned the design process is not linear and that results in different outcomes of how the

some changes, and as a part of the user research i was conducting focus group for user testing UX concept which was quite wasteful for the end project. As the project developed, the scope of the project got clearer and the planned methods got changed.

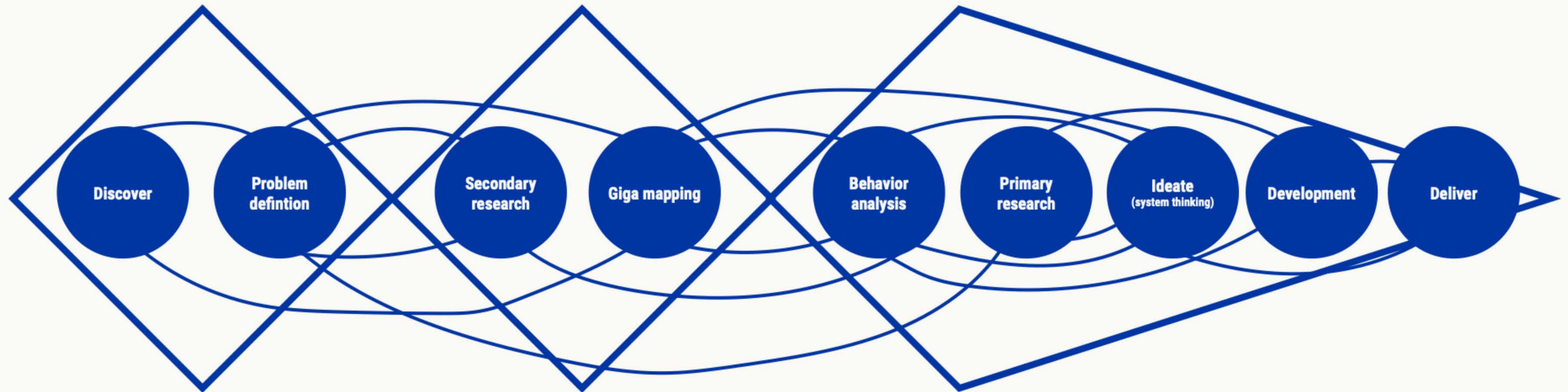


Figure 1.1: my design process

## PROCESS

My design process is based on the double diamond which is a design methodology built on four stages - Discover, Define, Develop, and Deliver. According to Design Council's. The creators of the double diamond states that it

process looks like every time - this time it look more like a triple diamond. This is due to two research phases on different topics.

When comparing it the plan I made in the beginning of the project, which was built on the original double diamond. There has been quite

## METHODS

### Secondary research

This study utilises a qualitative approach by analysing secondary research, since this topic is so broad and well research on a event level.

Secondary research is method that involves using already existing data (Muratovski, 2015).

### **Semi-structured Interviews:**

These interviews provide an opportunity for an extended response, but they are also limited by their format and scope (Muratovski, 2015).

### **In-depth Interviews:**

These interviews offer a thorough examination of what the participants might feel about certain issues. These types of interviews are open-ended and assume a conversational manner (Muratovski, 2015).

### **Giga-mapping**

Giga mapping is a tool for visualization of complex systems, as food waste is a super broad and a super complex problem, its allows us to cope with complexity better. It allows the spectator to view the system as a whole and investigate parts in detail as it does not separate the information and communication (Sevaldson, 2011).

In this thesis giga mapping has been used to structure research papers and data, followed by a ZIP analysis to investigate behavior and get an overview over where the problems are. In this

report it be some excerpt from the gigamap.

## **THEORETICAL BACKGROUND**

### **The Comprehensive Action Determination Model**

The comprehensive action determination model is a theoretical framework develop by Klöckner and Blöbaum, is a combination of three behavioral models, to avoid the weaknesses of these single models, the following models are; The theory of planned behaviour, The norm-activation-theory and The value-belief-norm-theory. The Comprehensive Action Determination Model assumes that behavior is determined by perceived behavioural control and intentions. As the third predictor we find habits, as it strengthens the behavior and moderate the relation between intention and behaviour. When going into depth on the model we understand that intentions influence the social norms, attitudes and perceived behavioural control and personal norms (Klöckner, 2013). The intention with Klöckner and Blöbaum model is to use it in my analysis of why we waste food to understand, in the text you will see that I refer to terms from this model.

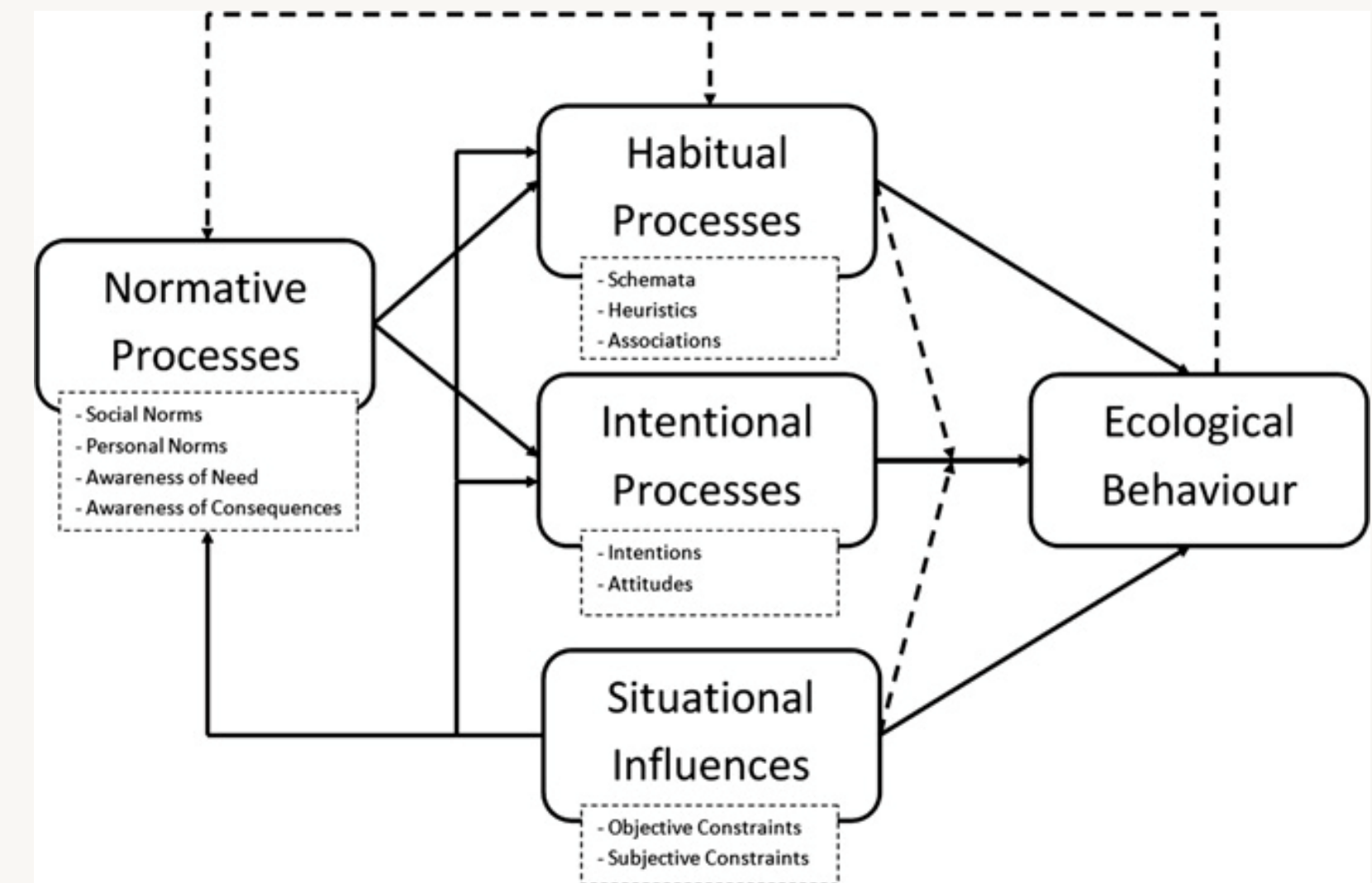


Figure 1.2: The comprehensive action determination model

### **Iceberg model**

A systems thinking model, the iceberg model is a way to think and approach problems as it asks for various elements within a system. The iceberg model works like an real iceberg, where only ten percent of its total mass is above the water, while 90 percent is underwater. This is a representation of how problems in today's systems can be viewed. we see the event, but not what is causing this. What is the relationships to other activities within the system, how is the pattern created and what are the root causes. This model has 4 different levels of thinking.

## 1. The Event Level

What's happening?

## 2. The Pattern Level

What's been happening? What are the trends?  
What changes have occurred?

## 3. The Structure Level

What has influenced the patterns? (rules, lesson plans, curriculum) What are the relationships among the parts ?

## 4. The Mental Model Level

What values, beliefs, and assumptions do you have about teaching?

The intention is to use the Iceberg model, to investigate the patterns of behavior, supporting structures, and mental models that underlie a particular event. By so this it will help us create an understanding of how the system is connect on how we can intervene to create changes. As this tool is used to not limit ourselves to looking at just a particular event, but to see within the context of the whole system (Systems Innovation, 2020).

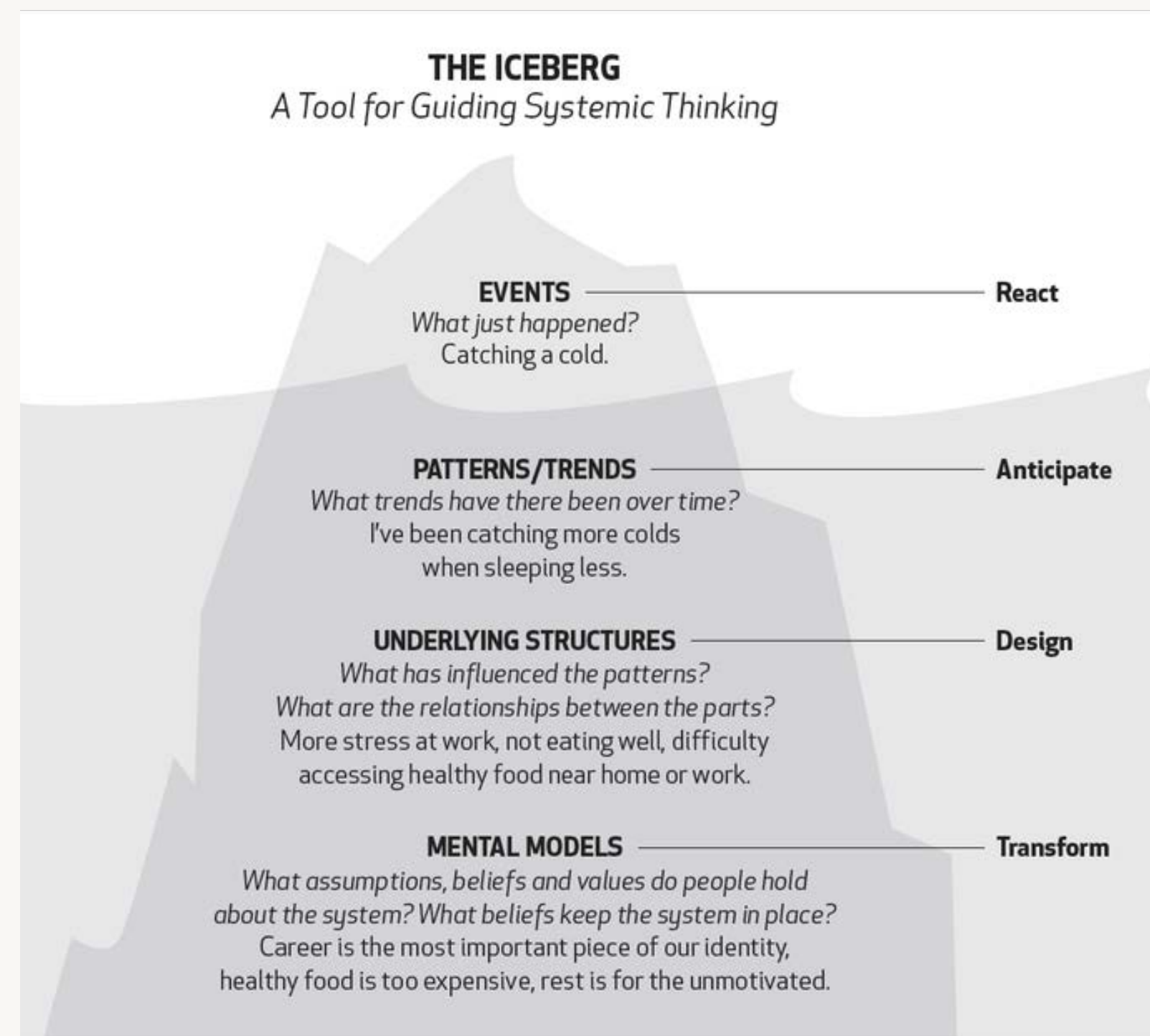


Figure 1.3: Iceberg model

## WHAT IS BEHAVIOUR? WHY SHOULD DESIGNERS USE BEHAVIOURAL SCIENCE?

How can we use behavioural design to change societal problems? In recent years, there has been a strong movement in the design field to use behavioural design, which has its origins in behavioural theory and social psychology. It has been a focus on how designers can nudge users in the right direction. Nudging is a concept that comes from the book “nudge” written by Richard

Thaler and Cass Sunstein. The book discusses how behavioural research can be used to influence people's choices in a positive way, where you have to assess what is ethically correct to assess as positive choices for a user. The focus of the book is on how to do this without using coercion (Nyhammer, 2021).

This is something that has caught the interest of many designers as they understand that behavioural research and theory can contribute to a deeper understanding of the user and how to change the way we act, it is our actions that define our attitudes. We must look at this project with a perspective on what is causing these actions. Why they are being performed and why are these actions being performed in the first place? By using the comprehensive action determination model, which is a model that describes how an action emerges, based on the influence of three different factors: norms and values, habits, intentions (what one believes and thinks), and the environment around them (Klöckner & Blöbaum, 2010).

Insight on how the mind makes decisions is a fundamental part of designing for behavioural change. By using this model we can analyze

the action of the consumers, here we can get a deeper understanding of how their choices are constructed and what patterns of behavior (Knutsen, 2020). There are a lot of methods out there, I have chosen to use this method because I know it well from previous assignments and it is one of the most popular methods in behavioural theory. Most of the problems with food waste are in the roots of who we are as individual, and how the social and cultural factors affect us.

## **RESEARCH ETHICS**

This project has been approved by the Norwegian Centre for Research Data (NSD) and were followed by their ethical guidelines.



# SYSTEM THINKING - (GIGAMAP)

Since this topic is broad and contains plenty of existing research, it was important to map all of the knowledge I managed to learn. As I was working alone, it could feel weird to make a Gigamap without any stakeholders. Giga mapping takes an approach to how systems thinking and design practice can create a comprehensive mapping of systems across many domains with a view to examining relationships between apparently unrelated categories, in order to find borderline pain points in the design and framing of the systems (Blaasvaer & Sevaldson, 2019).

By taking this approach combined with knowledge from behavioral design, it takes another perspective on the relationship between the different drivers of food waste in households. This project does not take a big dive into the food industry and their problem, as I considered that part already covered by other organizations. What the food industry does has an significantly impact on the consumers, but with the giga mapping approach its has been looking into the causes for the behavioral patterns.



Figure 1.4: Giga-mapping on the wall

**P.14**

# **Chapter 2**

–

**Research background**

## WHAT IS THE PROBLEM?

So what is the problem with food waste? And why is relevant for us to talk about it? More than one-third of all food produced is wasted in the food chain from production to consumption, where private households represent the largest food waste faction. To put this into context and how it has an effect on our climate. Food waste stands for 8% of the global carbon dioxide emissions, which means if food waste was a country it would be the third most polluting country in the world (MatPrat, 2020). This is problematic from both an ethical and environmental perspective as food production takes up 37% of the world's land, 70% of freshwater, and accounts for 24% of global climate gas emissions (Matsentralen, n.d.). Food waste is both a resource problem and a climate and environmental problem. It takes land, water, energy, and manpower to produce food - resources that are wasted when food ends as waste. It takes, for example, 15 000 liters of water to produce one kilo of beef, and 175 liters of water to produce one cup of coffee. The food industry also generates large greenhouse gas emissions from the production, transport, and packaging of food, to the disposal of packaging (Matsentralen, n.d.). A number of initiatives have been launched nationally and internationally, from

the international aspect, the UN's sustainability goals are the most well known. The sustainability goals are based on 17 different targets that form the core of economic, social, and ecological development. Food waste is addressed under Sustainable Development Goal 12.3, which aims to reduce food waste (United Nations, n.d.). According to the report produced by Matvett and Norsus it is shown that targeted and intensive work is needed to meet the industry agreement as the targets in the industry agreement are being increased to 30% by 2025 and 50% by 2030 (Norsus, 2021). Nationally, research has been initiated on how to reduce food waste in all sectors of the economy. Here, the initiative "Matvett" has been created by the food industry to reduce food waste (Matvett & Østfoldforskning, 2015). One of the more important research projects launched early on was the ForMat project, which ran from 2010-2015. The Format project had an approach of looking at how the food industry could reduce its food waste, but it has also been an important knowledge source for data on what is happening in households (Stensgård & Hanssen, 2016). According to the Norsus reports from 2020, it's clear that the consumers are the biggest contributors to food waste. Comparing data from 2010 with data from 2019 on consumers doesn't

give us much due to methods to collect data have improved since 2010 and the numbers are much higher than what it was. Looking into the food system and seeing the differences in emissions in the value chain, makes it clear that as designers we need to work more on consumers and change their behaviour (Norsus et al., 2020).

A study was done by the EATLancet commission on healthy diets and sustainable food systems in the Anthropocene. States that "There is a need for a comprehensive shift in how the world eats, it is unlikely that it will achieve the sustainable development goals—with food and nutrition cutting across all 17 SDGs—or meet the Paris Agreement goals"(Kaur, 2019). As mentioned, it cuts across all 17 SDGs. The quote emphasizes the importance of change in our consumption behaviour and should encourage designers and researchers to rethink how users can be nudged for a better daily habit.



## WHAT IS FOOD WASTE?

Food waste is defined as all usable parts of food produced for human consumption that are either discarded or removed from the food chain for purposes other than human consumption, from the moment animals and plants are slaughtered or harvested (Matsentralen, n.d.). In Norway, we consumers throw away an average of 40.3 kg of edible food a year, and a family of four has an average of 160 kg of food waste. From the Norsus report in 2021, it is stated that this is leftovers from prepared meals, bread, bakery products, fruit and vegetables. The food we throw away corresponds to a value of 2300 kr, this is money we could save if we used the food we bought better. In the whole consumer chain we throw away a value of 12.5 billion kroner (Norsus et al., 2021). To create a limitation in the scope of the task, it will not look at inedible food and drink resulting from cooking that is and has not been edible for us humans under normal circumstances. Examples of inedible waste are meat bones, coconut shells, or orange peels. It's no concrete numbers out there on how much inedible food is getting thrown away, but this is perfect for consumers to use in their compost.

## SUSTAINABLE DEVELOPMENT GOALS

Rockström and Sukhdev have developed a new way of viewing how all the Sustainable Development Goals are connected, by splitting up how the economic, social, and ecological aspects have all a directly or indirectly connecting to sustainable and healthy food. This is one of the reasons many people who work with food waste often say they are working with all the SDGs and not only 12.3 which is often seen as the highlight or the specific goal.

The illustration describes how economies and societies should be seen as embedded parts of the biosphere. This vision is a take on how to look at sustainable and healthy food in a new holistic way, instead of the traditional way where social, economic, and ecological development are seen as separate parts (Stockholm Resilience Center, 2016). The Sustainable Development Goals are relevant for the solution as one of the three interdisciplinary themes they have integrated into all the subjects in school are sustainable development (Lassen, 2020)

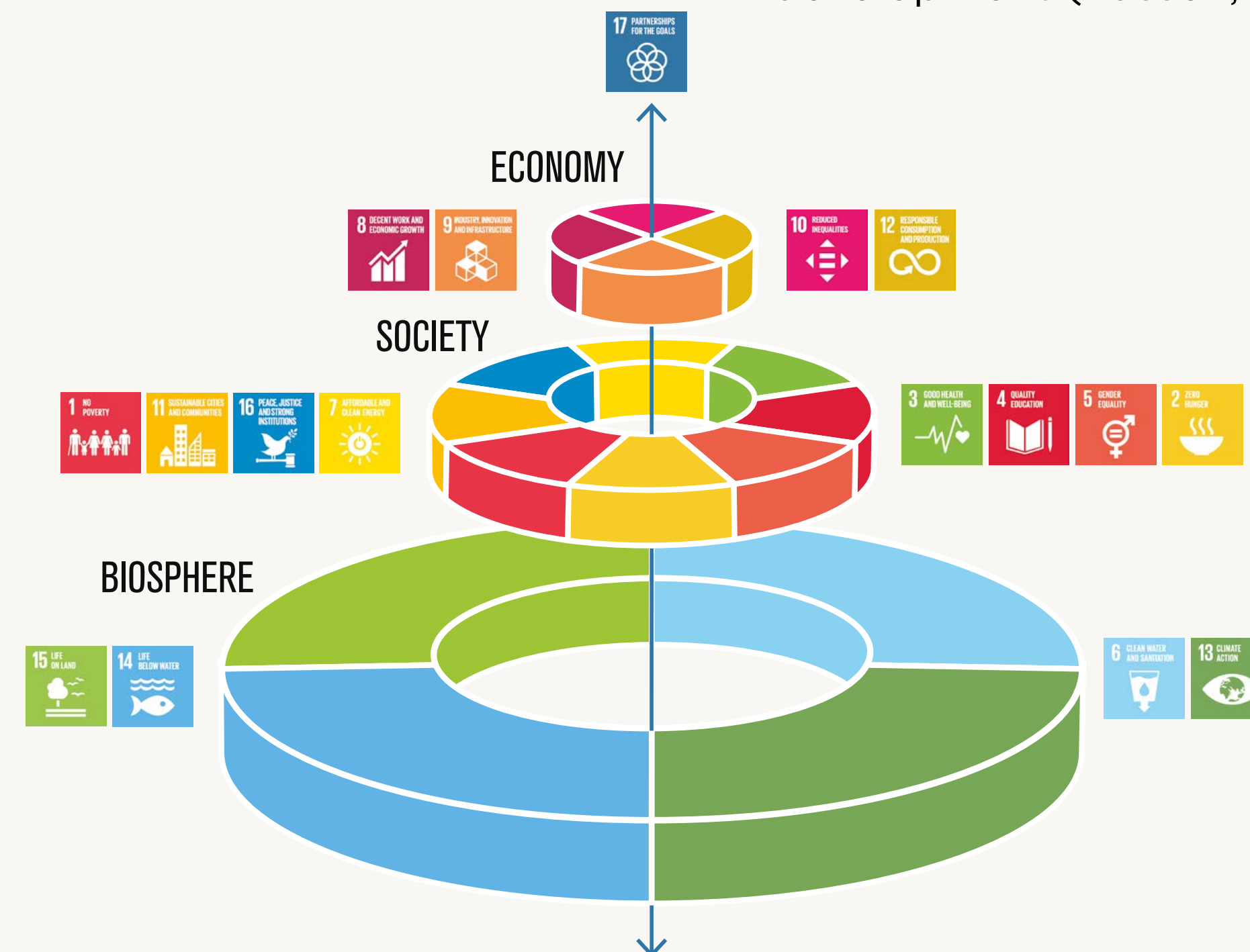


Figure 2.1: The SDGs wedding cake

Graphics by Jerker Lokrantz/Azote



## WHAT ARE THE CONSEQUENCES?

Matprat is one of several organizations that run information campaigns to inform residents about why we need to reduce food waste. We hear all the time that we must reduce food waste, but why is it so important? Matprat has listed four reasons why food waste is an environmental and climate problem.

### 1. FOOD PRODUCTION REQUIRES THE USE OF RESOURCES AND CAUSES CLIMATE GAS EMISSIONS

According to MatPrat, we throw away 1/3 of all food produced in the world, we produce but don't eat it. This is a significant part of the world's climate problem. This represents an unnecessary use of resources and emissions of climate gases, here we are talking about every stage of the food chain from the farm to the dining table is contributing to waste. We are dependent on food being produced as we need food to survive, and the emission coming from food production is unavoidable. If food production is not done in a responsible way, it can lead to deforestation and one-sided agriculture, and thus to loss of biodiversity, runoff of manure, depletion of soil, and overfishing (MatPrat, 2019).

### 2. FOOD WASTE CONTRIBUTES TO CLIMATE CHANGE

As mentioned before, greenhouse gas emissions from food waste are equivalent to the third largest country in the world, only China and the US are contributing more (MatPrat, 2020). This does not only mean food waste contributes to climate change, but is a big contributor. The largest global food waste emissions come from grains - 34 percent, followed by vegetables and meat, which account for 21 percent each. According to MatPrat (2019) has climate gas emissions from food waste globally increased from 225 kg CO2 equivalents per person in 1961, to 323 kg CO2 equivalents in 2011. This increase is due to more food being thrown away in industrialized countries.

In Norway, food waste accounts for an annual emission of 1.35 million tonnes of CO2 equivalents, and represents 2 percent of total climate gas emissions in the country. Calculations from 'Framtiden i våre hender' show that cutting food waste in Norway to zero would have the same climate impact as removing more than 400 000 cars from the roads (MatPrat, 2019).

### 3. FOOD CROPS SEIZE LAND AND NATURAL RESOURCES

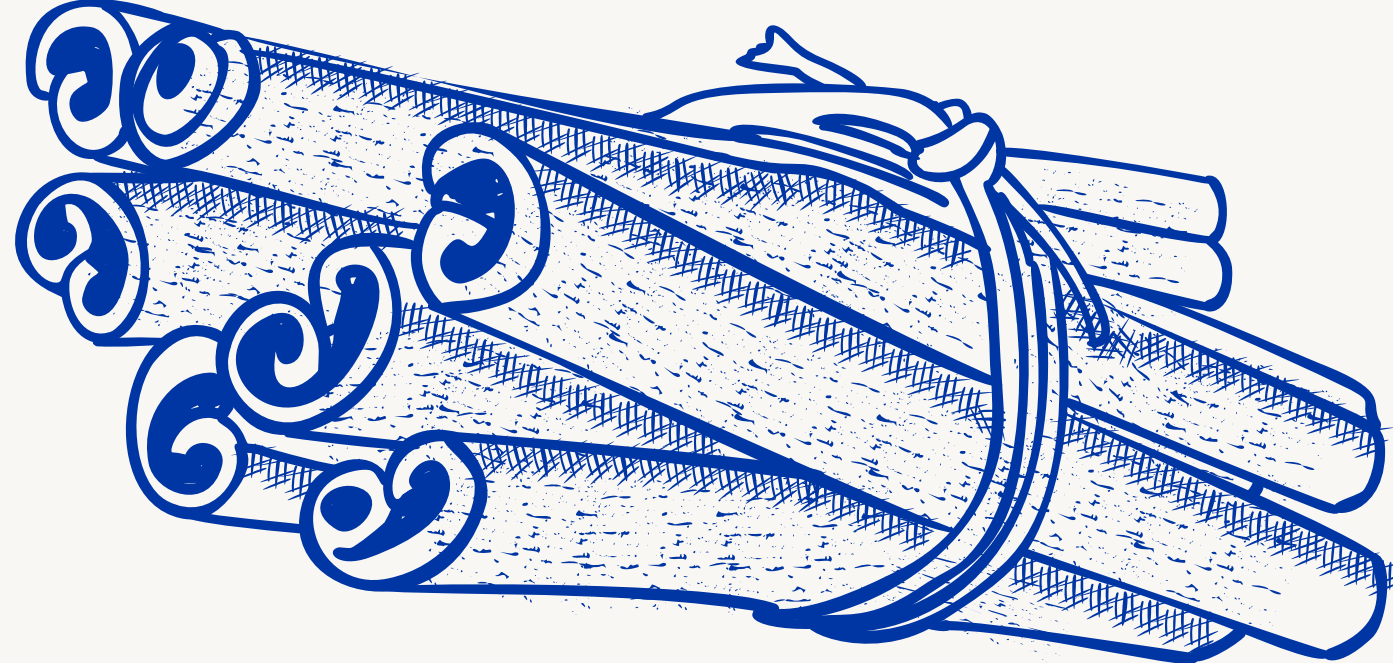
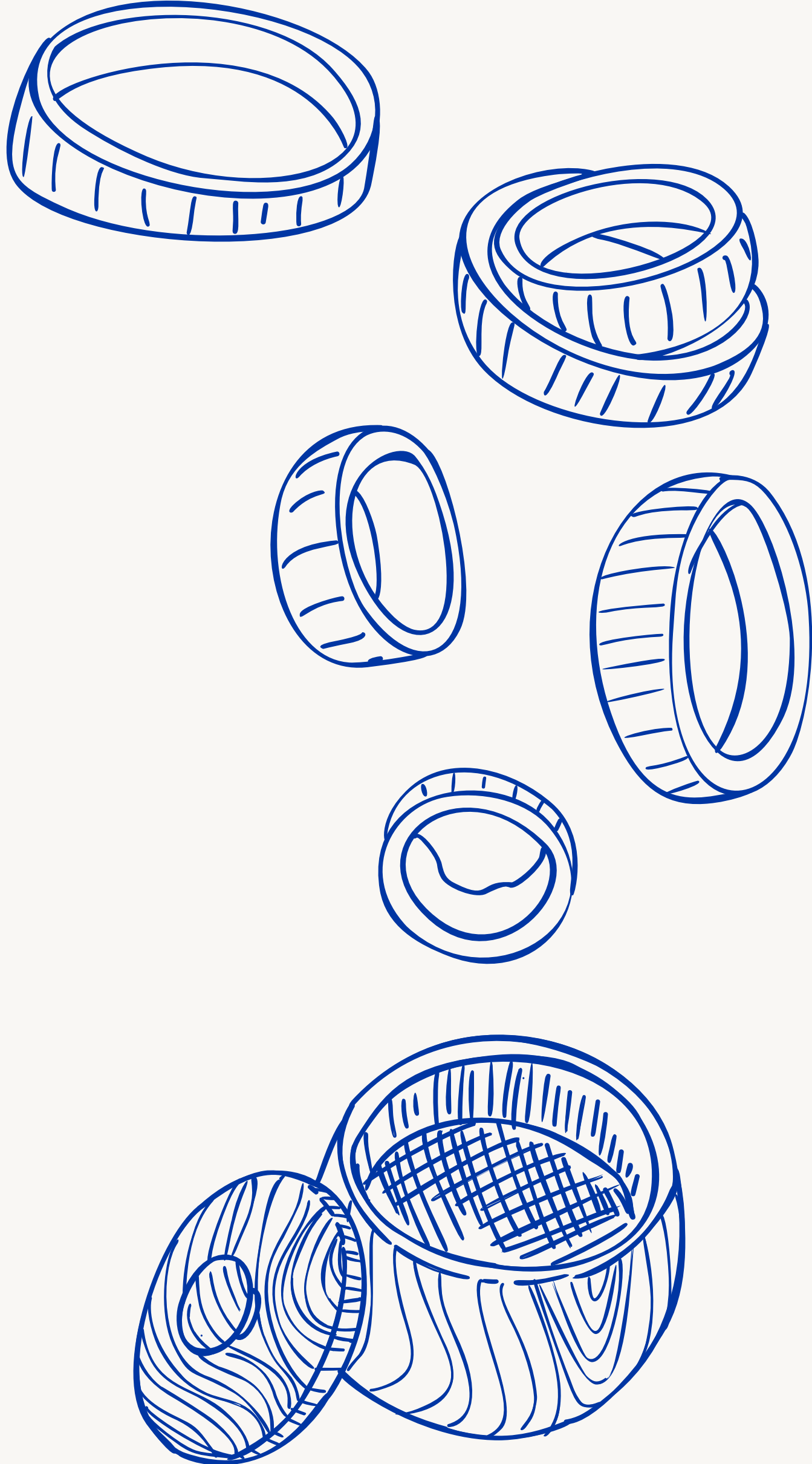
To put things into perspective, the food that ends up being thrown away covers an area of 14 million square kilometers. This is equivalent to an area larger than the whole of Europe and India combined. This is a big waste of nature areas and the ecosystem services, as is it affected by the use of resources to produce food. The increasing need for food as we need to compensate for wasted food is resulting in more need for production area, as the production is area-intensive, this often comes at expense of biodiversity, such as rainforests.

Different types of food waste have different environmental and climate impacts. The largest food waste emissions globally come from grains - 34 percent, followed by vegetables and meat, which account for 21 percent each. As MatPrat (2019) explains the loss of grain has the greatest impact on biodiversity loss, especially when produced in tropical regions. Meat accounts for 3-4 percent of food waste in the world, but it accounts for a high proportion 34-38% of emissions as cows, sheep and goats release methane when they convert grass into milk and meat.

A reduction in food waste will free up land area, and lead to lower use of water, and energy. In addition, a cut in food waste will reduce the environmental impact of food production globally (MatPrat, 2019).

**4. FOOD WASTE IS AN ETHICAL PROBLEM**

Throwing away edible food is an ethical problem, due to the reason that 1 of 9 people in the world lives in chronic hunger. The food thrown away globally can feed closer to 2 billion people, which is more than twice as many as today's undernourished (MatPrat, 2019).



**P.19**

# **Chapter 3**

–

**Reasons for food waste**

# WHAT DO WE THROW OUT IN NORWAY

In 2020, 453 650 tonnes of edible food ended up as waste in Norway (Regjeringen, 2021). This is about ten percent less food waste than was measured in 2015. As the figure explains, the consumer accounts for the largest share of food waste, almost half. The food industry has produced 237 500 tonnes of food waste (Regjeringen, 2021).

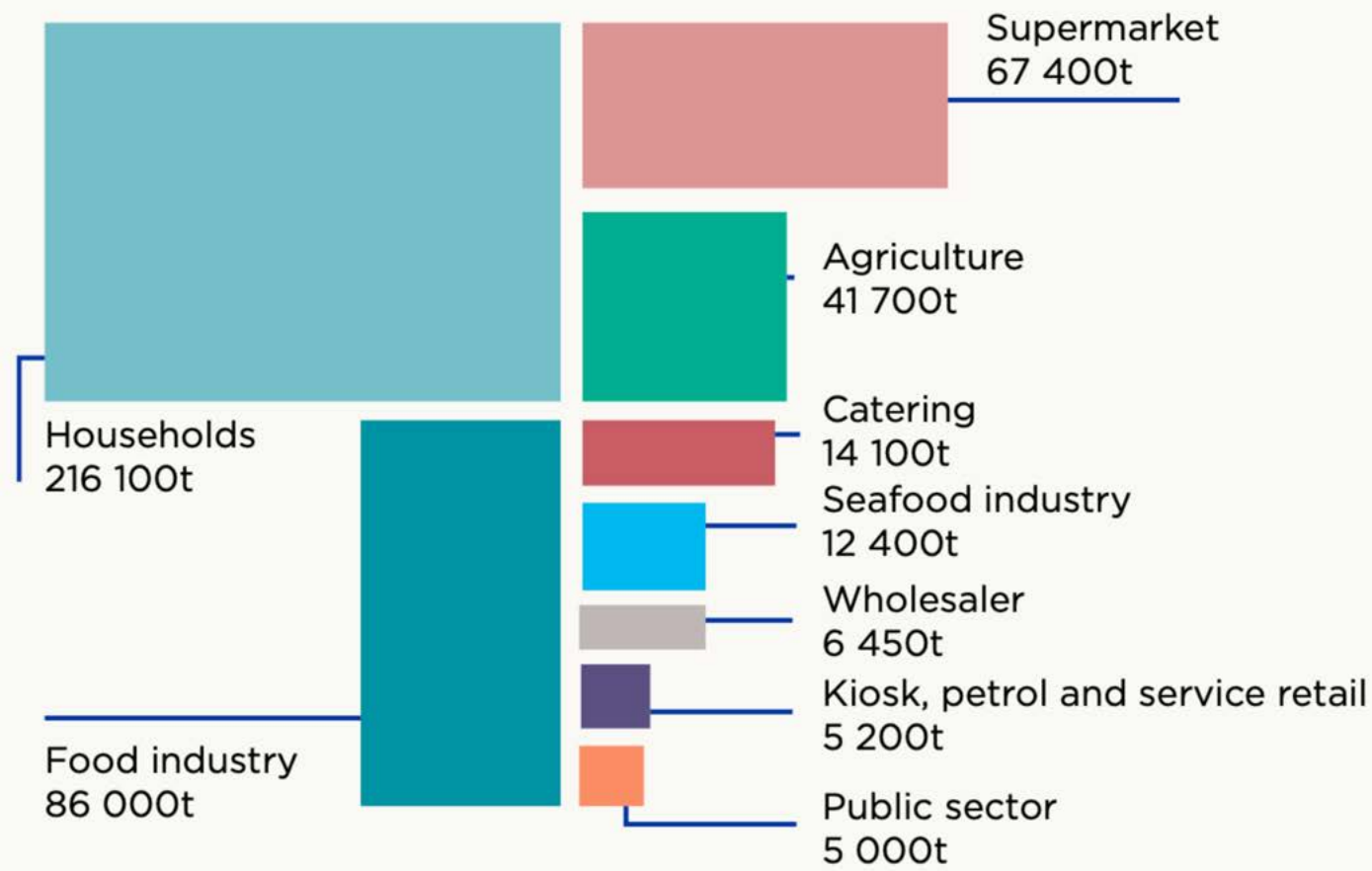


Figure 3.1: Numbers from "Bransjeavtalen om reduksjon av matsvinn: Hovedrapport 2020"

Consumers account for 216 100 tonnes of food waste and on average 40.2 kg is discarded. As you can see in the table, food waste in the household sector consists of leftovers meals, fruit and vegetables, bread, and other bakery products:

Food waste in 2020	
Type of food	KG
Casserole and leftovers	<b>12.5</b>
Fruit and vegetables	<b>8.8</b>
Bread and other baked goods	<b>7.3</b>
Dairy products	<b>2.1</b>
Meat	<b>2.3</b>
Fish	<b>1.0</b>
Miscellaneous leftovers	<b>6.2</b>

Figure 3.2: Numbers from Matvett

## WHY DO WE WASTE FOOD?

There are many different reasons why we throw food, we don't throw because we enjoy it - expect for when we get a clean up the fridge, we get a good conscience (Hebrok & Heidenstrøm, 2017). We know it's a bad thing to do, but much comes down to how we view food. In the following parts we will try to break down some key factors for why we behave like we do, and why do we waste food when we deep down know it's bad? Firstly we have to study the numbers, as we saw earlier that the numbers between 2015 and 2020 had reduced by ten percent.

## HAVE WE IMPROVED?

It is estimated that total food waste in the household sector accounted for around 222 300 tonnes in 2016 and 216 100 tonnes in 2020 as seen in the figure (Norsus et al., 2021). The amount of food waste calculated for the household sector has therefore been reduced by about 6 200 tonnes, or 3%, in the period 2016 to 2020. This corresponds to a reduction of 6%, measured in kg of food waste per capita. Measured in kg per capita, food waste in households is reduced from 42.6 in 2016 to 40.3 in 2020 (Norsus et al., 2021; Regjeringen, 2021).

	2016	2017	2018	2019	2020
Tonn matsvinn	222 300	220 800	219 200	217 650	216 100
Kg matsvinn per innbygger	42,6	42,0	41,4	40,9	40,3

Figure 3.3: Tonnes of food waste and kg of food waste per capita in households by reporting year

The Norsus (2021) report mentions 3 key factors for why food waste has been reduced by 6%.

1) Increased evidence of food waste as a problem. Matvett, the food industry, municipalities, public companies, more and more actors linked to the sale and donation of surplus food (Too Good To Go, Throw No More, Foodlist, Matsentralen, Holdbart, Havaristen etc.), networks, profiles on SoMe (Spisoppmaten and fattig.student) have all contributed to putting food waste on the agenda. In addition, in recent years there has been more research on food waste and food waste has been raised on the political agenda both nationally and internationally (Norsus, 2021; Steinnes & Hebrok, 2019).

2) Physical adaptations of food products. The waste of food in households may probably also have been reduced as a result of concrete measures related to products and packaging from the food industry. This includes the introduction

of additional best-before marks, open/close mechanisms on the packaging, increased shelf life of products, information on shelf life and recommended storage of products, better selection of smaller packaging, etc (Norsus, 2021).

3) Covid-19. Behavior within the households is likely to have been affected by the pandemic, with more people spending more time and probably eating more at home (closed catering outlets (possibly only takeaways), home offices, closed schools and kindergartens). One would think that this contributed to increased food waste in households, which may also be the case as the trend is uncertain and the trend from 2019 to 2020 is unknown. At the same time, several consumers (about 1/3) reported that the corona pandemic contributed to them throwing less food as a result of more time available, shopping less frequently and/or storing more food (Stensgård et al., 2020). What's exciting to see here is that families with young children with good health have reduced food waste the most during the pandemic. According to MatPrat, which has obtained its data from Nofima, they have reduced their food waste by 31%. Without access to research, it can be suggested that this is due to better routines, more time, and a better overview of what is available

in the kitchen - because more time is spent in the kitchen. Corona changed our habits and made us eat more often and most likely more leftovers (Norsus, 2021; MatPrat, 2020).

What you see with these three changes is that two of the additions come from changes within the food industry, while the last change has been inflicted due to unforeseen changes in everyday life.

### WHY DO WE WASTE USABLE FOOD?

According to Hebrok and Heidenstrøm, have identified five aspects to the main causes that lead to food waste in households. These five aspects approach of how we are handling food in our everyday life - see figure (Hebrok & Heidenstrøm, 2017). When it's looked into the cause of why we throw, data obtained from the Norsus et al.(2020) report shows that 'consumers experience of uncertainty' and 'planning purchases and meals' both are the main contributors for reasons of why we throw away useful food. Planning purchases and meals has received plenty of attention, but designers and researchers haven't found any solutions that contributes to less food waste.

Hebrok and Heidenstrøm explain further that 'consumers experience of uncertainty' comes from the uncertainty users get when they are trying to assess with their senses with the product is still edible. The uncertainty of their own skillset is leading to them either putting it back to where they found it or throwing it away. In their study they found out that the users are considering different factors to evaluate the food. "how long the food has been stored, if the packaging is intact or not, changes in how the product appears visually, texture, smell and taste, and with packaged food - if the date has expired. In this case, an expiration date contributes to both an increase and decrease in the consumers'

experienced uncertainty." (Hebrok & Heidenstrøm, 2017). The date label is increasing our certainty and uncertainty if a product is still edible, however the presence of the label makes us try to use our senses when the date has passed or is close, depending on the experience we have with the product. The feeling of uncertainty is often linked to what cannot be sensed by looking, smelling, or tasting, or to changes in a product's quality that are not considered acceptable by the user. As mentioned we are driven by experience we have previously had with this product, this makes us consciously aware of what is acceptable and safe for us (Hebrok & Heidenstrøm, 2017).

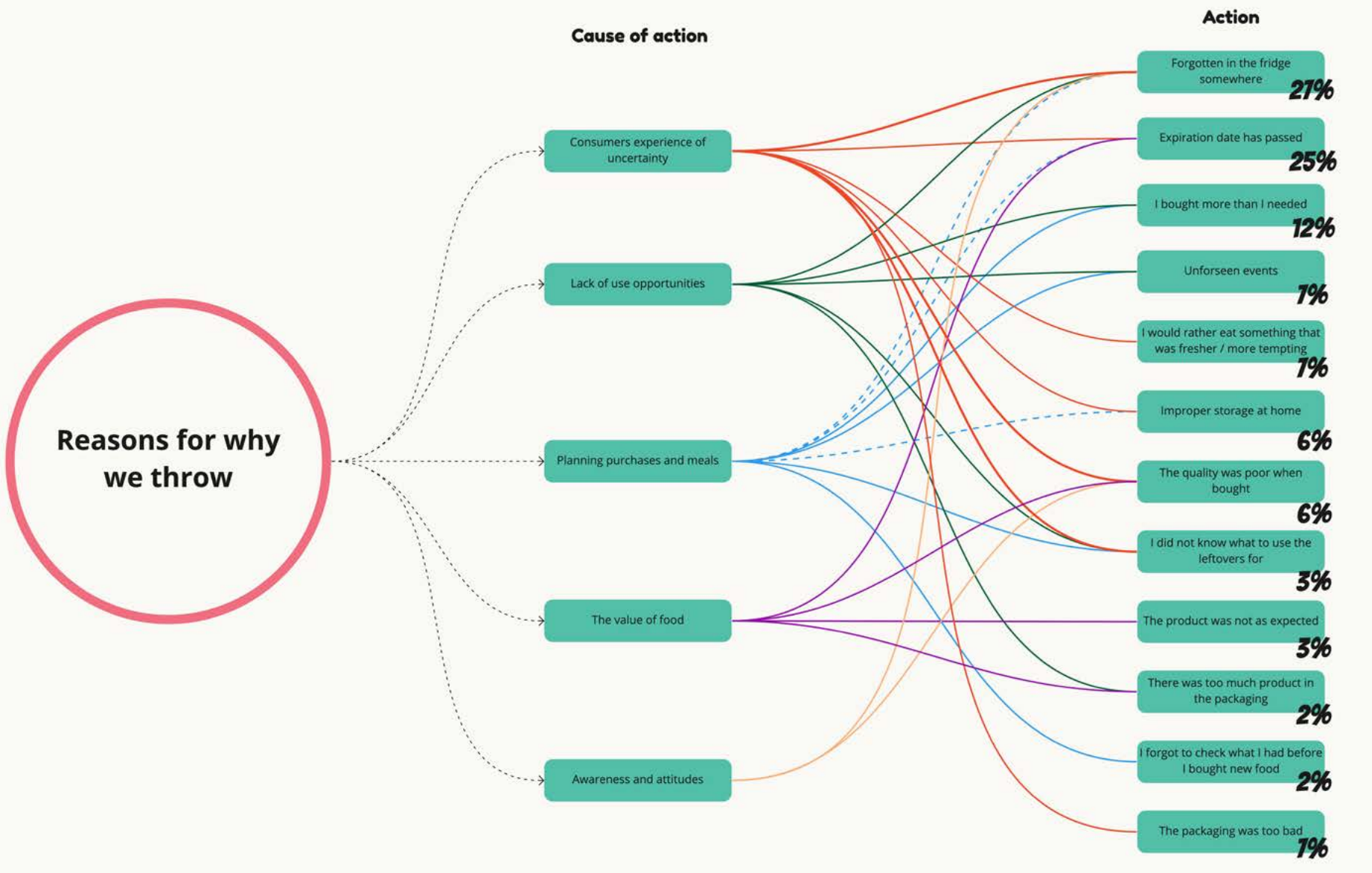


Figure 3.3: Illustration of how our behaviour is controlled by our actions

Tharaldsen and Bringsli (2016) have written a magazine for NorgesGruppen, where they explain how we have four different categorizations of consumer groups on how they throw food.

**Families with children:** “We often have leftovers, but we’re not very good at eating them. We’re probably also quite careful about throwing away food that’s gone out of date. We can definitely be more skillful at using our senses of smell and taste before throwing away.”

**Young couples:** “We always check the date stamps. If the food has expired, we almost always throw it out. We’re not very good at making leftovers, so I guess we feel we can afford to eat fresh food every day.”

**The single:** “ Overall, I don’t throw away much food, because I live alone and don’t buy large quantities. I often make simple meals, for example pasta with oil, cheese and herbs. That said, I probably throw out a lot of bread. I won’t eat dry bread.”

**The elderly:** “ I pretty much just buy what I need and eat it. That a few products have expired, I rarely bother with them when they are marketed

‘best before’, and they don’t smell or taste bad.”  
(Tharaldsen & Bringsli, 2016)

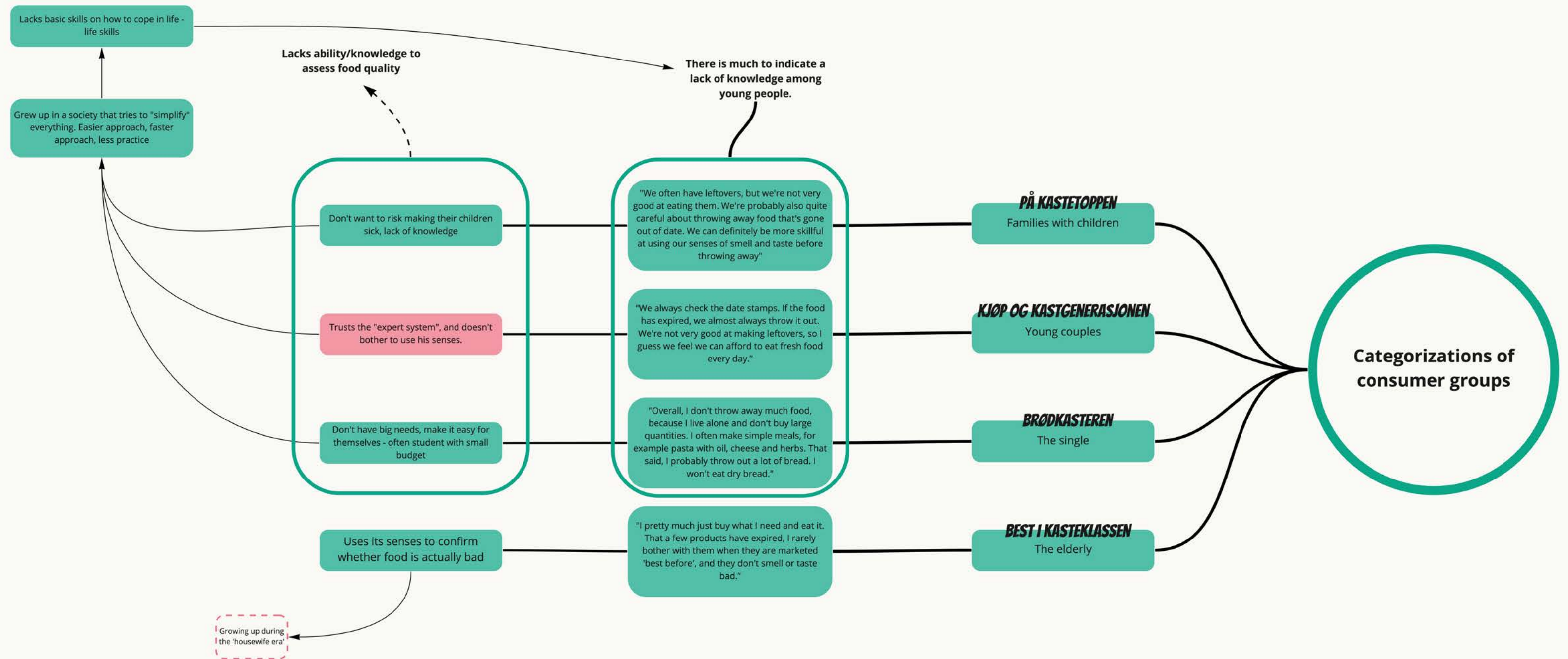


Figure 3.4: Excerpt from the gigamap on how consumers lifestyle is defining us

# WHAT IS THE ATTITUDE OF THE NORWEGIAN PEOPLE TOWARDS FOOD WASTE?

In today’s research, there are signs that people are fully aware of where food waste occurs and highlight, among other things: leftovers that are left too long in the fridge and lose quality, leftovers that does not make up for a whole meal, food that is perceived as tasteless or boring, food that is prepared in excessive quantities (Ravnsborg, 2018). All of these factors play in our actions. When looking at some principles in behavioral design, it’s our actions that create our attitudes (Nyhammer, 2021). Our consciences think it’s both stupid for themselves and the environment to throw food. As the figure here shows, most agree that “to throw away food is to waste time and effort spent on procuring and preparing the food”. When it comes to awareness, the economy and the environment are the biggest factors that trigger consumers to throw less food, they look at throwing food as throwing money and that it is harmful to the environment (Hebrok & Heidenstrøm, 2017; Ravnsborg, 2018).

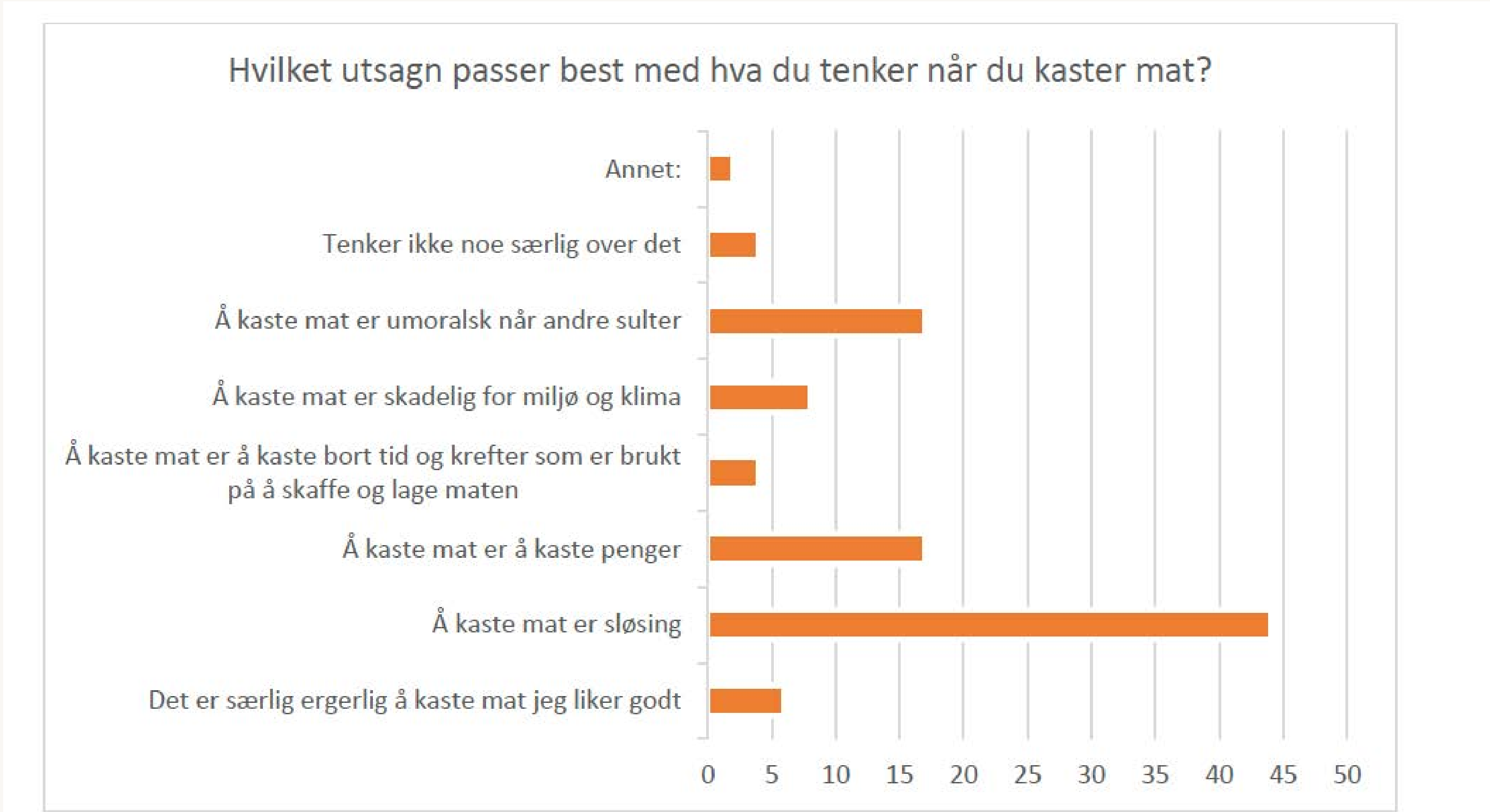


Figure 3.5: Attitudes to food waste from “Maten vi kaster. En studie av årsaker til og tiltak mot matsvinn i norske husholdninger”



## THE UNFAMILIAR FOOD

Planning and problems with unfamiliar food occur when the household sticks to the habits of everyday life. According to Hebrok & Heidenstrom (2017), much of the food waste emerges when they have to deal with food they are not used to using. This is found on several occasions, such as when they have to try something new, when they have to prepare dishes for a special occasion, when they buy unfamiliar products for a special dish, or receive food gifts that do not fit into their everyday routines. Food products that occur in these contexts are more demanding to incorporate into routines. In many cases, food products end up sitting on the shelf until they are thrown away. This shows how unchangeable everyday habits can be, how everyday routines make it difficult to challenge new practices, it takes a long time for us to introduce new habits - in this case, to introduce new products into food practices.

## CONSUMER LIFESTYLES

The consumer lifestyles is something must be considered, as families with small children has an lifestyles that is lifestyle that is highly routinised, but still very many unpredictable. If we look at young couples they have a more unpredictable

day to day routine, instead they do what tempts them - going out instead for what they have bought in for dinner (Hebrok & Heidenstrøm, 2017; Tharaldsen & Bringsli, 2016). According to Aschemann-Witzel et al.(2018) is the consumer lifestyles impacting the households as ways of living, its assumed to be anchored in the individual´s value priorities. The core is formed by our attitudes, beliefs and individual values, as well as the households are impacted by cultural influences, societal trends, and technological development.

## VALUE OF FOOD

When we look at the value of food and what it means to us consumers, this has a big impact on how long we are willing to keep the product in the home before it is thrown away. How it's impacting your conscience - will you throw it away or not. Consumers find it easy to throw away something that is understood to be worthless or used up. Here it could be that the intention of the food is used up, and they have no plans on what to do with the rest of the product, then the meaning has decreased so much that it holds no value for them. Hebrok & Heidenstrom (2017) has been analyzing their interviews and state the way their participants explain about food it's about the

value of the food in different ways. This comes down to what value this has for the consumer, Hebrok & Heidenstrom (2017) have explained these values in four different terms: as monetary value, as emotional and relational value, as quality and taste, and as utilization of value. Ravensborg (2018) uses the same terms and looks at how consumers are influenced by their normative ideas. In this context, the consumer is more reluctant to discard meat because it comes from a living being. What influences the price of food has a lot to say, some find themselves more reluctant to throw away food that is seen as high quality and is expensive, than the cheap stuff which is easier to throw away. Throwing away an animal life is perceived as socially unacceptable or throwing away expensive food feels like wasting money.

**Monetary value:** Expensive food such as meat and fish is thrown away less often than cheaper food, and cheaper food leads to more throwing away (Hebrok & Heidenstrom, 2017).

**Utilization of value:** It is simpler to waste food that is partially used than if the product is unused (Hebrok & Heidenstrom, 2017).

**Emotional and relational value:** Food prepared by friends or family, or food that requires a lot of effort, is thrown away less often compared to food bought ready-made (Hebrok & Heidenstrom, 2017).

**Quality and taste:** Food that tastes good is more difficult to discard than food perceived low quality and bad taste (Hebrok & Heidenstrom, 2017).

## UNCERTAINTY, HOW DOES IT AFFECT US.

The uncertainty we face in front of the fridge - many of us find ourselves looking for food in the fridge and assessing whether we can eat it or not. When the uncertainty hits us, we put the product back into the fridge and wait until it's bad before throwing it out. It's believed they feel more okay to throw it in the bin when it's visually bad, even though we have no intention to use the product (Hebrok & Heidenstrom, 2017).

Several consumers base their assessments of risk and uncertainty in relation to food sustainability on what they believe, think, and feel. It turns out that assessments of whether the product is considered edible or inedible are not made in the

same way every time, but vary according to the type of food, whether the packaging is broken or not, and what the sensory evaluation tells us, and data analysis. This may suggest that more knowledge about both expiring labels and sensory

evaluation is needed among growers to reduce the uncertainty associated with shelf life (Hebrok & Heidenstrom, 2017).

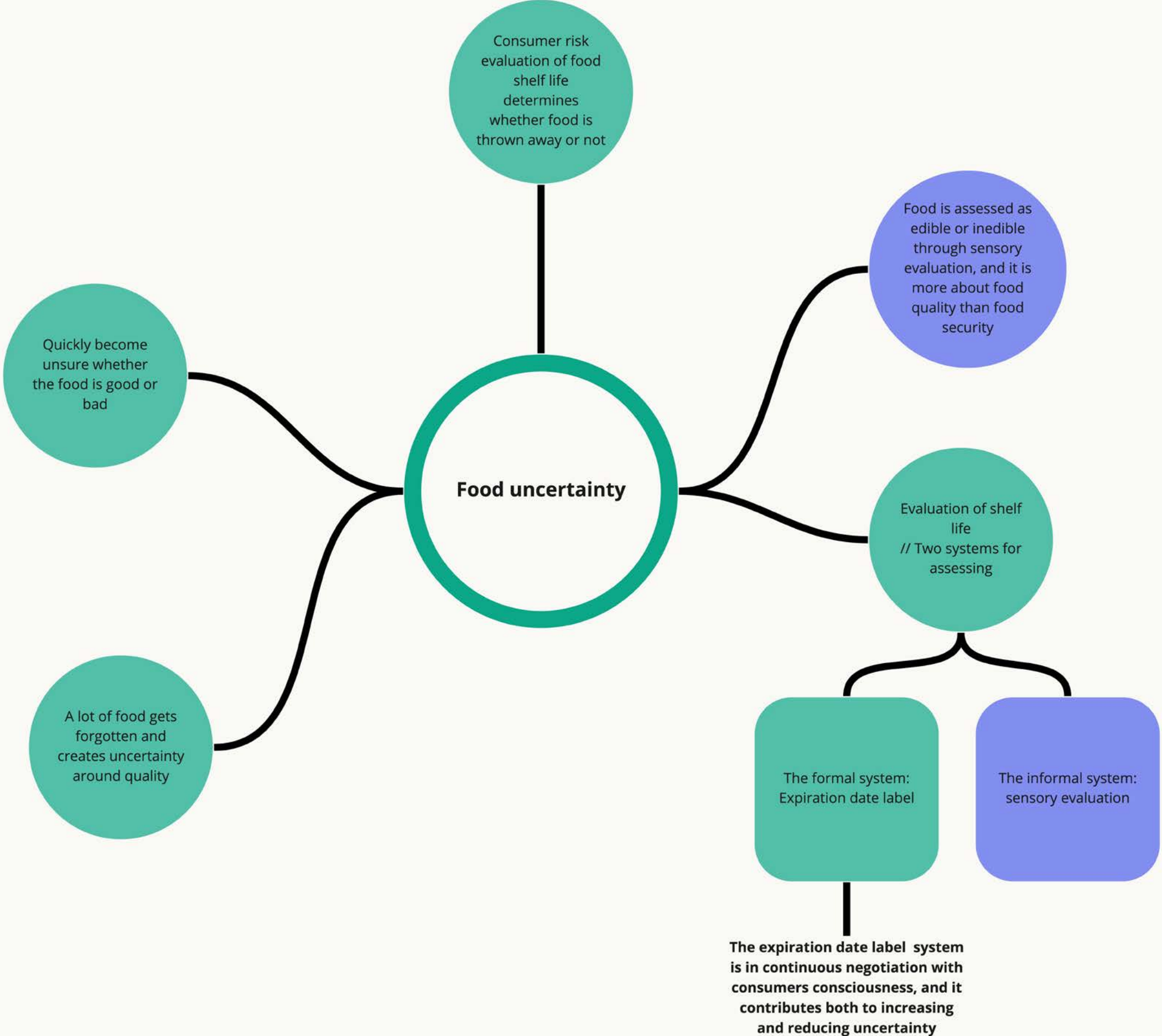


Figure 3.6: Excerpt from the gigamap on how food uncertainty is affecting us

# EXISTING TOOLS FOR FOOD WASTE REDUCTION ON A CONSUMER LEVEL AND WHY THEY FAIL?

## Tools for consumers

In the course MAPD5000 Technology and Design, I did a study that looks into how consumers can change their shopping and eating habits to more sustainable consumption levels and how today's technologies aid us in that. It takes a critical view of how mobile application features work within sustainable food chains and how today's features affect how users perform tasks such as reducing food waste. By exploring how technology and more specifically mobile applications have adapted to aid us in the right direction (Knutsen, 2021). The reason for specifically looking into mobile applications is due to two reasons, first, it's now an extension and a part of our daily life. Secondly, it allows users to gain easy access to information, products, services, and processes that they need in real-time and have been optimized for hands-on interaction in the past decade (Hilliard, 2014; Knutsen, 2021).

The finding from this study suggests that today's

mobile application market is not designed to handle trending topics such as food waste. This is due to two reasons, the first one is many users find themselves struggling with memorize the instruction of one step, as it takes too long to memorize. This is in addition to the struggles of use, in research from Ren et al.(2020) it shows that 74% of the interviewees mention that it was hard to use the touchscreen as their hands are oiled, wet and occupied. The second reason is that today's food cooking apps are similar in many ways and offer very few features that will enable users to reduce their food waste. Most of the applications that offer something is about how the users lack knowledge on how to use up their leftover ingredients. Most people has the knowledge on how to put together an omelette with leftover ingredients, but it depends on many more factors such as - is this what they want to eat now? It's clear that users who are conscious about this topic is not being provided benefits from these applications, as it provides them the same outcome of doing a search on google themselves with the ingredients they want to use. It's a clear need for sustainability features that are inspiring and user friendly (Knutsen, 2021).

## Planning

When it comes to planning it's plenty of good advice for consumers on how they can reduce their household food waste. Today's planning advice is about how the user can keep track of their inventory, store food properly, calculate the correct amount, and eat their leftovers. As seen in the study on what aid mobile applications are providing - it's clear that these food recipe applications are trying to integrate how you can make planning more intuitive (Knutsen, 2021). Plenty of campaigns also suggested that you should make a weekly menu and create your own day for eating leftovers, like 'leftover Thursday'. All these advices together make a great solution, but when it comes to ideal practices it does not always correspond to reality and our everyday lives. Planning is something most of us are trying or wish to get better at. This does not necessarily lead to better behavior or less food waste, due to many factors and since life is too unpredictable, this can especially be true for young couples and families with children. Therefore it's suggested that the best thing you could do is to shop from day to day, unless you have full control of your routines which is often the case with single and students (Hebrok & Heidenstrøm, 2017).

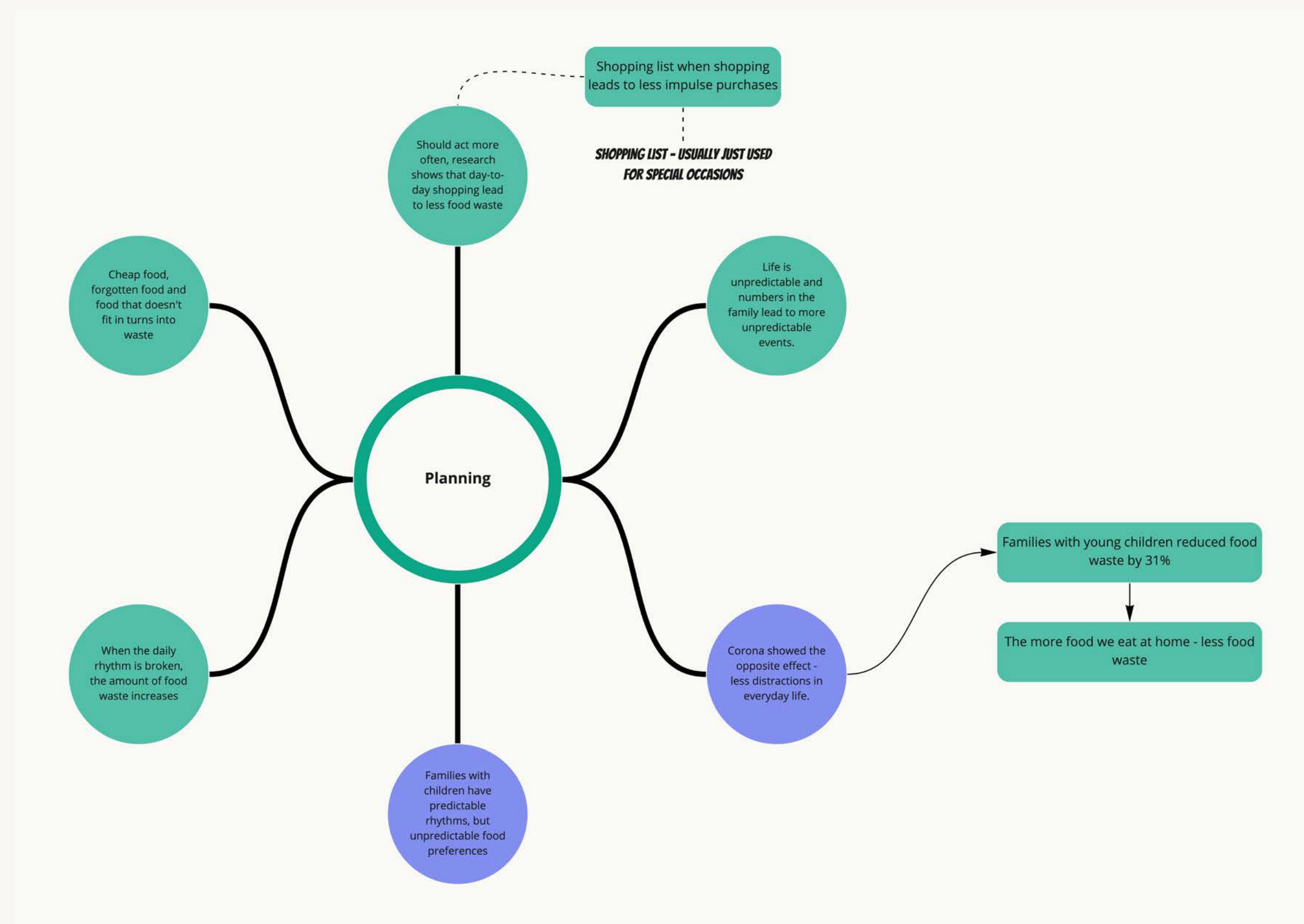


Figure 3.7: Excerpt from the gigamap on how planning works for consumers

## **KNOWLEDGE - WHAT KNOWLEDGE DO WE NEED?**

Based on the research I have conducted I have concluded that we can split knowledge of how to reduce food waste in households into two sections, how to use the leftovers and ingredients in the household, and the second how we can evaluate food with sensory evaluation. If users can't use knowledge to evaluate the food, is going to be much harder to use ingredients that the household already possesses. Today's tools in the fight against food waste mainly provide users with solutions on how to use their leftover ingredients. As seen previously, today's generation is lacking knowledge on how to use their senses. If the elderly generation has failed to pass on that knowledge, it's time to look into other ways to retrieve that knowledge back. Therefore we can find four suggestions in the Norsus et al.(2020) report, these are highlighted as what the authorities should focus on in the future. 1) Competence development in schools and kindergartens 2) Continuing the work on food waste in the public sector 3) Implementing pick analyses for households 4) Ensuring stable and adequate funding for the food centers.

One of the suggestions is aiming for better competence development, as my understanding is the same after conducting my interviews and research. It is suggested that there is a lack of knowledge among young people. They lack the ability to assess the edibility of food without a shelf life label (Tharaldsen & Bringsli, 2016; Norsus et al., 2020). In primary school, we are laying the foundation for what kids are supposed to learn to be ready for the grown up life, as suggested the government should bet more knowledge enhancement. In today's primary school, they already have a subject called 'food and health'. which could be a perfect platform for enhancing today's learning on how to use their senses better to evaluate the edibility of food.

## **“EXPERT SYSTEM” - WHAT HAS HAPPENED TO OUR SENSES?**

When we look at what happens in the categorization of the four consumer groups, we see that they use the 'expert system' much more the younger they get. Today's families with young children have grown up using the shelf life label as a confirmation of whether the quality of the product is good or bad (Hebrok & Heidenstrom, 2017). Judging by sensory evaluation seems to be

disappearing, and today's consumers need to learn not to be blinded by the label. Cooking is a habit we develop from the time we are little, from when we put butter on our first slice of bread until we move out and cook dinner for ourselves. Changing the habits we develop since we are kids, can be a big challenge if their intention and attitudes (intentional processes) doesn't suddenly change.

## **DO WE KNOW WHAT SHELF LIFE IS?**

The shelf life is what defines how long the food lasts, in Norway we have two types of shelf life labels: "Siste forbruksdag" and "Best before", and these refer to different ranges of use (Mattilsynet, 2019). According to Stensgård and Hanssen (2016), 78% of consumers say that they have a good knowledge of the two systems of shelf-life management. At the same time, 80% of the group at the age from 16-39 say that the best before date is an important reason for why food is being thrown away, and as much as 42% of food is thrown away because of this (Stensgård & Hanssen, 2016). Stensgård & Hanssen (2016) further explains that in their study everyone believed they had knowledge of and knew the difference between the two systems of date

measurement; 'best before' and 'last day of consumption'.

When we look at examples taken from Hebrok and Heidenstrøm (2017) studies. They point out that informants report that the shelf life label loses its function when food has been opened over time. The user then uses a different type of knowledge, and no longer has confidence in the 'expert system'. A difference is seen when assessing the quality of food for oneself and one's children. When it comes to their children they are much stricter on the date, this goes back to what experiences they have with the product in the past too. When you've experienced that food gets bad from lying open in the fridge, it contributes to it being thrown away without sensory evaluation first. In some contexts, the product is discarded after a certain time that is considered "too" long by the user because the gut feeling indicates that the product does not have the desired quality anymore (Hebrok & Heidenstrom, 2017).

## OUR BEHAVIOR

If we follow Klöckner & Blöbaum's model, we can look at how attitudes around shelf life arise. When we are looking into how our normative

process, intentional process, habits, and situational influences are creating our behavior. Here it's interesting to look at which factors that prevent us from behaving sustainably. The situational influences us with constraints. Its built on and determined by the total set of accessible. We have supermarkets that are easy to access and the food is fresh and cheap, when we compare how much money we use today on food compared to our spending in the housewife era (1960). We spent around 40% of our salary, and now we spend 11% (Valvik, 2013). This has a huge influence on why we so easily throw away our food, even though we see it as a waste of money. The normative process is constantly going back and forth on the awareness, as awareness of need and awareness of consequences are playing a role here. The need for fresh food, due to the uncertainty about the safety of the food you possess is. While you are clearly aware of the consequences of throwing food, this could be affected by our environmentally friendly approach that has risen the last couple of years. As green nudging is about pointing towards nudging strategies that "aim to promote positive environmental behaviour". However, green nudging can create contagion effects, such as positives and negatives. For example, an environmentally friendly choice in one situation

may make the individual feel that they have a sort of free pass to act in less environmentally friendly ways in subsequent situations (Bashir, 2021). An example of what negative consequences might have been created by our waste management system, is that people feel less guilty when they throw food (Hebrok & Heidenstrøm, 2017).

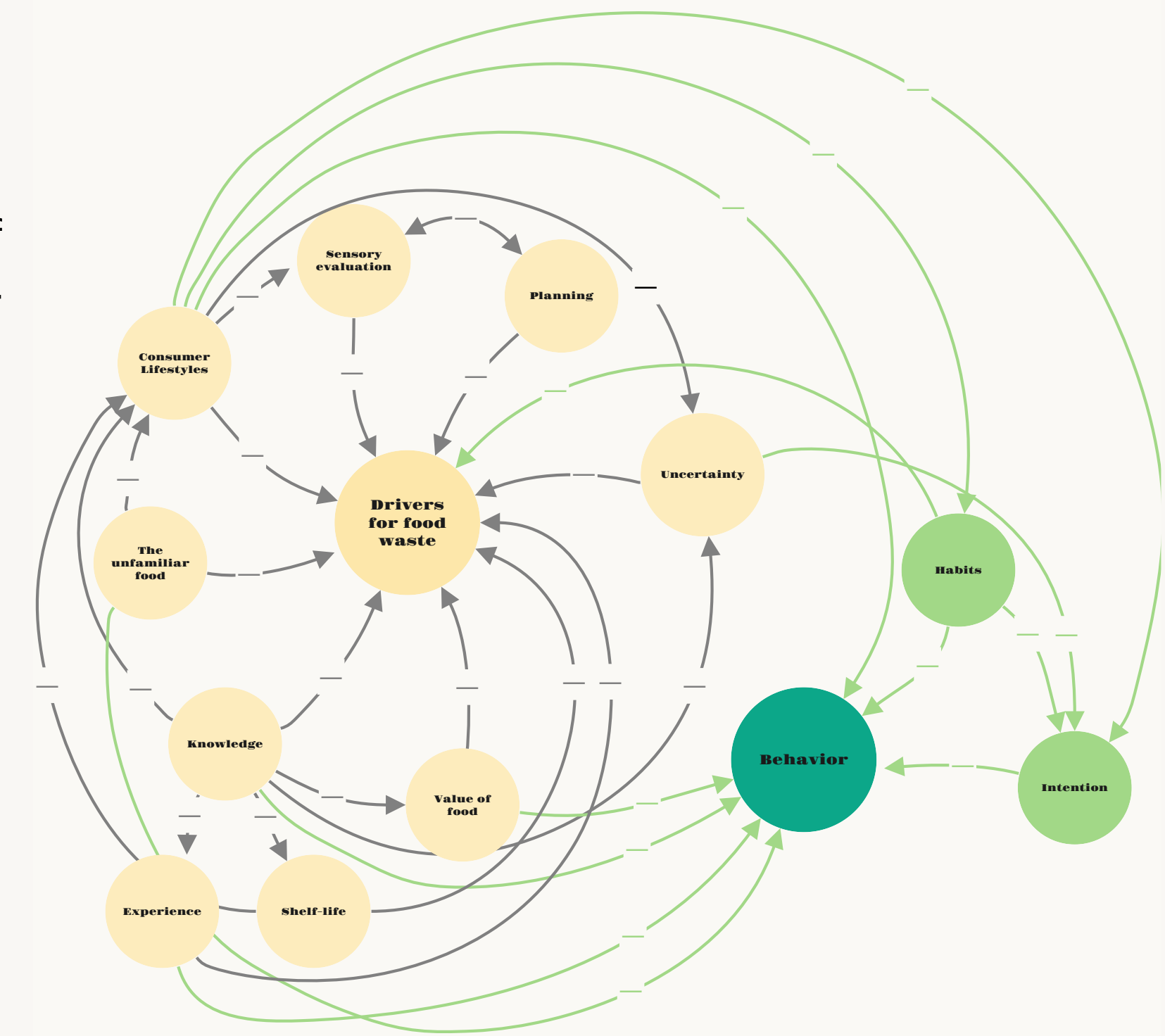


Figure 3.8: Excerpt from the gigamap on what are affecting the drivers for food waste - negative feedback loops.

When it comes to the habitual process, this is where we process our experiences with the food on previous encounters. What do we associate with sour cream that was opened 2 weeks ago? or with chicken that has expired past the expiration date. As mentioned before it's also has an affect on who you are serving for. As the intentional process plays their factor in here, what is the intention with this meal? If you might serve your kids, then you are more protective, and this is believed to be one of the reasons why families with children are on the top of the chain, when it comes to waste. When you compare it to single people, they are associated to care less about what they eat, due being less protective of themselves (Goyal, 2016). So which senses do we use while cooking?

The senses we mostly use during cooking are sight, hearing, smell, taste, and touch. When you're cooking and preparing food, evaluating recipes, putting together menus, and setting the table; you're using all these senses to make sure the food tastes good and looks inviting.

## SO WHICH SENSES DO WE USE WHILE COOKING?

The senses we mostly use during cooking are sight, hearing, smell, taste, and touch. When you're cooking and preparing food, evaluating recipes, putting together menus, and setting the table; you're using all these senses to make sure the food tastes good and looks inviting.

### Eyes

On the retina we have sensory cells that detect light and colours. This is the foundation of what you see and how you perceive the sensory impressions. The latter is learned and relates to background of your family and culture. This also applies to food and meals. Dishes that are tempting in a family or culture, can be perceived as undesirable in another. But the very majority will be tempted by colours and colour combinations. This can be used when putting together menus, preparing food and setting the table (Arsky et al., 2021).

Arsky et al. (2021) describe it further that the eyes are something you use all the time while cooking. You use your eyes to assess whether techniques are being used correctly, whether dishes and

pastries are cooked properly, whether the texture is right, whether the food is laid out properly, whether the dishes are sufficiently clean, and if the food is edible.

### Nose

Inside the nose are sensory cells that detect odors. These cells can distinguish between up to ten thousand different smells! The sense of smell is important for digestion. The smell of food triggers the separation of spit and prepares the body for the coming food. Smell is also important for enjoying a meal. Much of what you describe as taste, is actually smell. You also use your sense of smell to detect if food is about to be burnt, or if a pot is boiling dry. Occasionally small pots or the baking paper during frying can catch fire which is something you quickly notice. The sense of smell is therefore important, also for safety in the kitchen (Arsky et al., 2021).

### Tongue

On the tongue you have taste buds that allow you to distinguish between the five basic flavours: sour, sweet, salty, bitter and umami. The basic flavours are actually the only flavours we can recognise when the sense of smell is "removed". Other cells on the tongue can detect if the food is sufficiently

hot. This is important both to get the perfect taste experience and for the food to be safe to eat. Food and drink taste different at different temperatures. The fragrances in food usually taste more when they are heated up. Sometimes we want to bring out a lot of the flavour, other times we want to tone it down. In these cases, we can use temperature to get exactly the flavour we want (Arsky et al., 2021).

### **Ears**

The ears have sensory cells that detect sound. You may not think about it. But you use your hearing quite a lot when you're cooking. You use it to assess whether the water is boiling, or to detect alarms when something has been raised, boiled or fried (Arsky et al., 2021).

### **Skin**

Your skin has sensory cells that sense temperature, pain and touch (pressure). You use these sensory cells when you cook. You detect the correct temperature of the liquid when you are baking, judge whether the frying pan is hot enough for frying, or whether the water is cold enough to be served. It's important to be able to feel pain when you're cooking. If you touch a hot pan or a hot grill, you'll quickly move your hand away to avoid

serious injuries. You'll also stop cutting if you cut your finger. When baking, you use even pressure sensing to assess whether the dough has the right consistent, and when cutting, chopping or slicing, you'll make sure the knife is correctly positioned in your hand (Arsky et al., 2021).

## **KEY INSIGHTS SUMMARY**

- » Consumers are responsible for over half of food waste.
- » It is the food industry that has pushed us to throw less food, not changes in our attitudes.
- » Uncertainty hits us when we have to judge the food
- » Young people lack knowledge about how to use our senses
- » Food with no practical purpose gives us more reason to throw it away.
- » Unfamiliar food interferes with our everyday routine
- » Our attachment to the product (food value) determines how long we will retain the product.
- » There is an urgent need for increased knowledge in primary schools
- » Need to create good experiences around food that is associated as "bad food"
- » We use 4 senses to consider edibility - eyes, nose, tongue and skin.

## **REFLECTION**

This chapter has gone into the problems and how they occur, and it has taken a deep dive into patterns of behavior, it's still plenty to research and to understand. We also have to consider ethics here, as the designer is considering these insight as the most valuable it could turn out wrong. It could be considered ethically wrong to intervene in real people's lives and their food practices. It is the intention of the authority to develop an more sustainable food practice by reducing our food waste. As we have seen, consumers are in charge of over half of the food waste in Norway, and therefore there is a need for green nudging. As is seen an need for competence development in school, it would be only right to nudge them from an early age into how they can take sustainable decisions for the earth. The need for developing an understanding on how to assess if food is edible is increasing, and consumers today are facing lack of a knowledge, lack of intention, increased uncertainty, and decreasing food value. Having a good economy and access as food is normal for the more less everyone in Norway. With more selection and cheaper food, it's a result of the grocery stores competing with each other. It leads to us reducing the monetary value we associate with the food.



**P.33**

# **Chapter 4**

–

**Implications  
for knowledge enhancement**

## **INTERVIEW METHODS**

Due to little existing research in food and health and what the effects from these classes are, it was chosen to conduct semi-structured interviews with food and health teachers in the Oslo area. This was done due to the time and financial expenses that could be incurred by any physical interview, here the interviews were conducted digitally and recorded for further analysis. This is something that could have been done outside Oslo as well, but the purpose of the interviews was to get a better overview of the teaching style of food and health teachers. The findings of the interviews and research suggest that interviews should be conducted with teachers located in the districts as well. There has also been semi structured interviews with a student in the education program for kindergarten teachers, but this interview turn out to not be important for the case - however it gave insight into what they learn about sustainability and food practice. In addition I had two similar interviews with university teachers, who are directly involved in the education of food and health teachers and the initiation of pilot projects to improve the level of learning. It was conducted two in-depth interviews as well, one with a contact teacher and an interview has been conducted with an employee from the food center,

who teaches a course at primary school about food waste.

The findings from the interviews will be presented in the chapter, this will be done by discussing interesting findings that are common to both the interview subjects and previous research.

## **WHAT IS FOOD AND HEALTH CLASSES?**

The subject of food and health has existed for 125 years, changing its focus from being a practically useful and educational subject focusing on how to carry out tasks in the home, to now where the focus is looking at the connection between food and health, consumption and culture (Bottolfs, 2020). In 1939 the subject became obligatory for girls in urban schools, it was only in 1959 that the subject became obligatory for both boys and girls and changed its name to 'heimkunnskap'. In 2006 there were some changes with the introduction of the kunnskapsløftet and the change of the name to 'mat og helse' as we know it today (Bottolfs, 2020). The school is obliged to ensure that students develop healthy eating habits and a lifestyle that promotes health in the short and long term. According to Bottolf (2020), the school's

work with nutrition operates on two different levels: one is the school meal and the other is the teaching of food and health. Here we see that the school has ambitions to change habits and lifestyles in the long and short term.

## **FOOD AND HEALTH - WHAT CAN IT ADD**

In this chapter we will look at what the food and health subject can bring to this matter. How decisive is the teacher's competence, to promote the three interdisciplinary themes? After 2020, they have implemented three interdisciplinary themes which must be recurrent themes in all subjects: Public health and life skills, democracy and citizenship, and sustainable development (Lassen, 2020). According to Bottolfs (2020), the teacher's competence and ability to communicate are largely decisive for the pupils' learning outcomes. In order for students to gain a deeper understanding of how they can reduce food waste in the home by developing knowledge of sensory evaluation, it will be crucial that the food and health teacher has higher competence.

## INTERVIEWS WITH TEACHERS

I did three semi-structured interviews with food and health teachers from different schools in Oslo, they represented the three different categories we can split the competence into. Interview person one had a background from the restaurant business, the second person had a formal education background in food and health, and the third person had education as a teacher. What I found fascinating was how the background shaped their perspective around how the teaching should be. The person with a long background as a chef had clearly a good overview and insight into what was important to teach the students, but found the curriculum hard to interpret. The teacher with a formal education in food and health was significantly aware of the importance of the three interdisciplinary themes, as she loved to make her students aware of sustainable choices. The third one with a background as a teacher, was more a classic teacher, and was more concerned about the students' welfare.

As the last teacher is a representation of many food and health teachers without any competence background, it was fascinating to see how she perceives sustainable development. "At our school we have nice sustainable practices like waste

management in all classes". If we look back at how green nudging can create negative consequences, this looks like one of the scenarios. She is aware of the ambitions of the school to develop sustainability, but it can be interpreted that the waste management system at school is fulfilling her need for sustainability in her consciousness.

## HOW CAN CHILDREN LEARN WHEN SUBJECT TEACHERS ARE NOT QUALIFIED?

Bottolfs (2020) further describes with a report taken from SSB in 2014 showing that 54% of teachers who teach food and health in primary schools, do not have formal education (credits) in the subject. The proportion of teachers teaching food and health without formal education is highest at the lowest levels (lower secondary 64%, middle 61%), but even at youth school 40% of teachers teaching food and health lack formal education in the subject (Lagerstrøm, 2014). Of teachers with formal competence, 21% of teachers have 60 credits or more in food and health. The question we had to ask ourselves here, is 30-60 credits enough to have an understanding of how to teach to create and maintain healthy and sustainable habits. In one of the interviews with

the food and health teacher, the interviewee mentions that there is a great lack of competence among food and health teachers and "You can't compare 60 credits with what you learn as a chef in 10-15 years". She is concerned that they are not taking more former chefs into the food and health profession and offering them pedagogical courses. This together corresponds to Bottolf's (2020) reflection on the uncertainty to what degree students get knowledge about the connection between nutrition and health. Do they meet the government's and the Public Health Act's goal that the subject food and health must fulfill the school's social mandate in health promotion work. In today's food and health subject there are many demanding competence goals, and these can be difficult to meet if there is a lack of competence in the teachers who teach the subject (Bottolfs, 2020).

## **FOOD AND HEALTH CLASSES IS UNDER PRIORITISED**

In several of the interviews, they expressed the view that food and health is a subject that receives too little importance and is not given enough priority by management or municipalities. This is the subject that is at the bottom of the ladder, which makes it the subject that currently receives the least hours. There is a frustration with the attitudes among teachers and management in the food and health subject, and the concern is that it is a fun subject - we have to cook a bit here. The attitude among teachers who do not have subject competence is “I prepare and make food at home, so I can teach these students”. In the interviews, they say that food and health is seen as a ‘rolls and buns’ subject, a subject where you are supposed to relax and have fun all the time. As mentioned earlier, the students learning outcomes will most likely be worse if the teacher lacks competence in the subject. To understand how little food and health is taught in the course of 10 years of primary school, one can look at how many hours the subject is allocated. It has a total of 199 hours of the pupils’ total hours of 7496 hours, this represents 2.5% (Bottolfs, 2020). In an semi-structured interview with Bottolf, she mentions

things that concern her. Its two things, one is the knowledge her own students possess in food practice - she often sees students trying to be independent for the first time, struggling to cook a meal and have often little clue on what they are doing. Her second concern is the economical resources that are dedicated to teachers who want to increase their academic competence in the food and health subject. Here she mentions that there has been more and more people wanting and taking further education, but it is still not enough. One of the food and health teachers makes me aware of, that there is a big difference between being a food and health teacher in cities like Oslo and a food and health teacher out in the district. “I am overqualified to work in a primary school as an food and health teacher, however I am also completely useless”. This is because the subject is generally used to fill the positions of teachers who usually teach maths, Norwegian and English. It’s just the city schools that have enough resources to employ food and health teachers full time. When it comes to the importance of their work, the Bottolfs (2020) study indicates that approximately 2/3 of teachers believe they are an important resource in health education work, and of these, twice as many have high formal competencies as those with low. One of the participants expresses

the same and is very proud of the work she does “I think I have a very important job, I am laying the foundation for who they will be in the kitchen in the future”.

## **WORRIES AROUND FOOD AND HEALTH**

There has been a growing concern around food and health, that the subject is not seen as important enough. Today, children and young people do not receive sufficient quality education that corresponds to the competency objectives in the curriculum. There are not enough lessons for them to learn about the links between diet, physical activity and health. Lack of qualified teachers, most of whom are seniors who will soon be retired. There is a need for the subject to be upgraded from the ‘evil circle’ of unqualified teachers with a subject that is in financial need, to a subject that equips students with the knowledge and skills the curriculum requires (Sandvik et al., 2021). According to Lassen (2022) today major focus in food and health are:

- » Health-promoting diets
- » Sustainable food production and consumption
- » Meals as an expression of identity and culture.

When you look at health-promoting diets, this should be a big enough argument for why the profession should be ranked higher. According to Sandvik et al. (2021), the potential social benefit of the entire Norwegian population following dietary guidelines is a total of 154 billion kr per year, as estimated by the Directorate of Health in 2013. Good teaching in line with competence targets and increasing hours is therefore needed. The Ministry of Education itself states “It is well documented from research that pupils learn more when teachers have specialization in the subject they are teaching”. Had there been a shortage of teachers who wanted to be food and health teachers then it would have been understandable to a certain extent, but in 2021 there was an annual conference and a training course at the University of Agder. Despite the event being free, several teachers struggled to get travel expenses or funds for substitutes covered. However, competence in food and health is often underestimated, and there are no national competence requirements for food and health teachers in childhood (Sandvik et al., 2021). Sandvik et al. (2021) discusses the importance of the Ministry of Education introducing a competence requirement of at least 30 credits in food and health, for those who will teach at youth schools the requirement should

be 60 credits. When looking at countries such as Denmark, in 2020 they made it a requirement that Danish primary school teachers must have a bachelor degree in the subjects they teach (Gynther, 2016).

When looking at the structure of the school, it is common for contact teachers to teach food and health from 1-4 grades, but not all schools have food and health teaching before 6th grade, despite the fact that it is competency goals that must be learned within 4th grade. Because the subject is so easy to avoid, Sandvik et al. (2021) believe that it is important to include compulsory food and nutrition teaching in primary school teacher education for 1-7 grade. Creating change in the school owner (municipalities) is the best way to create change that leads to a positive impact on the system. The government presented new competence targets in 2020, and a strategic plan to strengthen practical and aesthetic subjects, the last time this happened was in 2006 (Sandvik et al., 2021). Here it will take a long time before changes are made, and it is unfortunately not changes that I will focus on in my thesis.

## **WHAT TYPE OF LEARNING IS THE FOCUS TODAY?**

Findings from the study done by Veka, Wergedahl & Holthe (2018) shows that recipes are completely dominant in the teacher’s planning and implementation of the training. It can seem that recipes are so dominant and can be seen as a new curriculum level. They describe it as the hidden curriculum. Today’s generation is getting better at reading and understanding the information they read, Because they are training on reading recipes and instructions, Beinert fears they lack the knowledge and understanding on how to prepare meals without recipes. Students need to learn more about how to connect to dietary advice, food labeling, and critical assessment when planning a meal in her paper on “An unexploited potential” (Beinert, 2021) and (Skogedal, 2021).

A brief look at the curriculum, shocked me - as the level on the curriculum was quite high. When investigating this during in-depth interviews it showed that curriculum is what they are aiming for, doesn’t necessarily mean they will actually learn it. Andersen, Garaas, Norum and Fredriksen have looked into what is required from a fourth-grader. Many of them might not have had

Food and health classes, as it depends on the school on when they schedule the students to have it. Working methods such as interpreting, understanding, and formulating must be used already at the primary level, from the 4th grade onwards. They don't find it reasonable to require such maturity as it forces children's natural development. They are worried the competence goals are too advanced in relation to the level of development the child is at (Utdanningsnytt, 2010). The curriculum got updated recently in 2020, and that leaves little room for systematic changes there. But this shows that it's clearly a need for improvement on several fronts within the food and health classes if the school wants to fulfill their potential on creating healthy and sustainable habits in the short and long term.



Figure 4.1: From observation of food and health class using surplus food

## WHAT RESOURCES DO TEACHERS HAVE?

After 2020, the new curriculum has led to all teachers working on interpreting the new competence objectives and creating new teaching materials. Since all teachers have different understanding of things, there will be different learning outcomes. To get a better understanding of how to reach out to teachers I conducted an

in-depth interview with a contact teacher at the middle school from Drammen. We talked about platforms for teachers that contain material for teachers. What exists today are paid platforms provided by publishers. For example, Aschehoug provides the A-universe, and Unibok provides digital textbooks and learning materials. When teachers have to interpret, create, and test how teaching is going given what the learning outcomes from the new curricula are, this can be demanding. During the interview, he points out that it is up to the teacher what the students learn, "it's all about how much effort the teacher wants to put in". This is something we have seen repeated by food and health teachers too. The contact teacher says he misses something official from Udir, "the only sharing platform we have today is groups on facebook".

This is interesting, through the project I have been tipped or found different teaching materials that take on the theme. This is always on different websites and you usually have to hear about it to find it. This shows a clear lack of a common platform for subject teachers where they can share and discuss their interpretations of the curriculum and how teaching should be or can be better designed.

## WHAT'S GOOD ABOUT THE SUBJECT?

“I am not satisfied with the design of the competence objectives - when as a teacher I have to read 7-8 times to understand what it really says. It's very much about exploring things, exploring how can meals contribute to good health.” - The food and health teacher tells me in one of the interviews. Most agree that the goals set are important and good for the school, but the way it is shaped out has made it more difficult for teachers to create concrete teaching proposals and creates more pitfalls it seems. Food and health has several competence objectives that are relevant to the theme I want to work with - when you look at the competence objectives for other courses you see that both science and social studies are relevant subjects to work in collaboration with here. The following competence objectives are taken from Udir in Norwegian

### **Mat og helse 8-10 trinn**

» Drøfte hvordan kosthold kan bidra til god helse, og bruke digitale ressurser til å vurdere eget kosthold og til å velge sunne og varierte matvarer i

anledning matlaging

- » Kritisk vurdere informasjon om matproduksjon og drøfte hvordan forbrukermakt kan påvirke lokal og global matproduksjon
- » Utforske klimaavtrykket til matvarer og redegjøre hvordan matvalg og matforbruk kan påvirke miljøet, klimaet og matsikkerhet

### **Naturfag 8-10 trinn**

- » Gi eksempler på og drøftet aktuelle dilemmaer knyttet til utnyttelse av naturressurser og tap av biologisk mangfold

### **Samfunnsfag 8-10 trinn**

- » Beskrevet ulike dimensjoner ved bærekraftig utvikling og hvordan de påvirker hverandre, og presentere tiltak for mer bærekraftige samfunn
- » Vurdere hvordan arbeid, inntekt og forbruk kan påvirke personlig økonomi, levestandard og livskvalitet

## KEY INSIGHTS SUMMARY

- » There are three interdisciplinary teams that must be integrated into all subjects at the school
- » Competence difference of teachers, we can divide them into three groups
- » 54% of teachers in food and health have no form of education
- » There is concern that there is too little competence in the subject, among those with education
- » Bad attitudes among teachers and school owners - it is not taken seriously
- » Big difference between teachers in big cities and schools in the districts.
- » Subject receives least hours in the primary school - 199 of 7496 hours (2,5%)
- » The benefits of a healthy diet can save society 154 billion kr
- » Should be introduced requirements and obligations on competence in the profession - Denmark introduced it in 2020
- » We are trained to read recipes
- » No official platform for learning material or discussion of interpretations.

## REFLECTION

When we look at the iceberg model, the food and health classes are a part of the structure. As we look at what has influenced the patterns of our behavior. As of today the education have failed to implement basic knowledge on food practice and many younger people lack knowledge in food practice, because they have only been trained to read instructions (recipes). Without information in front of them on how to do next step they seem clueless, this can be related to how they need confirmation if the food is edible from the expiration date label. The need confirmation from recipes, on how to put together the dish, has an absolute influence on our lifestyle when it comes to values, beliefs, and assumptions. This calls out for an need to improve the practical skills that are essential in life. To see how many teachers that lack competence and how the attitude are among school owner and teachers in the subject, is weird. It can be seen as a lottery what the learning outcomes for a student will be, this depends on the intention of the teacher. With the lack of will for creating changes from the authorities, as they want to focus more on theoretical subjects. With all these problem that are within the subject itself it makes it hard to develop a concrete educational framework for food and health classes, as they

lack understanding of the importance or will to implement it. However it will be important to develop a framework that facilitate for less need for expertise. To create changes it will be a need to shake things up and facilitate for changes in our values, beliefs, and assumptions when it comes to food practice.



**P.41**

# **Chapter 5**

–

**Solution**

## **MUST - SHOULD - OPPORTUNITIES**

This method is an inspiration of MoSCoW method, as MoSCoW stands for must have, should have, could have and would like but won't get (The Interaction Design Foundation, 2015). During our education we have gotten familiar with, MUST, SHOULD and COULD. COULD does not serve the project like OPPORTUNITIES do. Therefore I have chosen to replace COULD with opportunities because OPPORTUNITIES represents a brighter view on options and possible directions the project could take.

### **MUST**

- » Must include sensory evaluation
- » Must create an experience to boost the threshold on "low quality food"
- » Must be a framework for teachers

### **SHOULD**

- » Should be independent of the teacher's competence
- » Should promote the schools ambition on developing healthy eating habits and a lifestyle that promotes healthy and sustainable choices in the short and long term.
- » Should promote the importance of reducing

food waste

- » Should be able to gain more food and health hours by working interdisciplinary
- » Should gain more confidence and less uncertainty when evaluating food.
- » Should be adapted to learn to be creative with what you have

### **OPPORTUNITIES**

- » Opportunities to increase the importance of food and health classes
- » Opportunities for passing their knowledge on sensory evaluation in their households.
- » Opportunities for creating a sharing platform for all teachers

### **MEDIUM OF THE SOLUTION**

The project has revealed many issues and problems and barriers that needs addressing, but instead of reaching to widely the project directed its focus towards teachers. This project will be a foundation for others to continue on other problems mentioned here. As mentioned, there is a lack of a sharing platform that brings together 'official' learning resources that can be used. This means that the solution in this project has no place to be uploaded, unless it is sold to

subscription providers like Aschehoug or other book publishers. This makes it important to create a medium that can reach out to the teachers in this solution, this medium will be a website. The website is based on minimising friction points, to make the experience easier for the user, who in this setting will be primary and middle school teachers. The intention of the website is to provide a framework that includes elements of what teaching must be based on to achieve the desired behaviour and knowledge.

### **USER JOURNEY OF THE EXPERIENCE**

To explain how this solution will make a difference compared to other solutions out there, I will try to elaborate it through Figure 9.1 and explain what the outcomes of it will be.

The design solution is about how an experience can create new knowledge and habits that will be implemented. Today we have plenty of drivers for why we waste food, to change them all will be impossible unless its radical changes that are impacting our life quality. A great example of this is the covid pandemic, as families with children reduced their food waste with 31% (MatPrat,

2020). As explained in the chapter 3 about our behavior, our experiences affect the habitual processes we have. To manage and to create a change in our behavioural actions this solutions is therefore working on building trust and lowering the threshold to use food that is associated as low quality, ugly or blemish - unwanted food.

Since this delivery is a framework for teachers and especially food and health teacher, it has been important to look into how the structure of the framework should be. My previous intention was to use an exploratory teaching method that has its roots in science (naturfag), as it allows the students to research and understand the food in different ways. After my interview with the contact teacher, I have changed my approach to how we can activate learning. He suggested to use 'Learning by doing'. His perception on exploratory teaching method was that most teachers don't use it. But "learning by doing" is one of the most known methodology, as it is integrated into education program on how we create better learning. This methodology was developed by John Dewey who formulates the learning theory as "Learning to do by knowing and to know by doing" (\*Learning by Doing - En Aktiv Prosess\*, 2012). The theory builds on creating an

experience, for more memorable learning. It works because the student is allowed to collaborate in the planning, production and understanding of the experience. Roger Schank summarize it quite well; "I have analysed how learning works, and the basis is to ask, do and fail, ask for help and try again"(Iberdrola, n.d.).

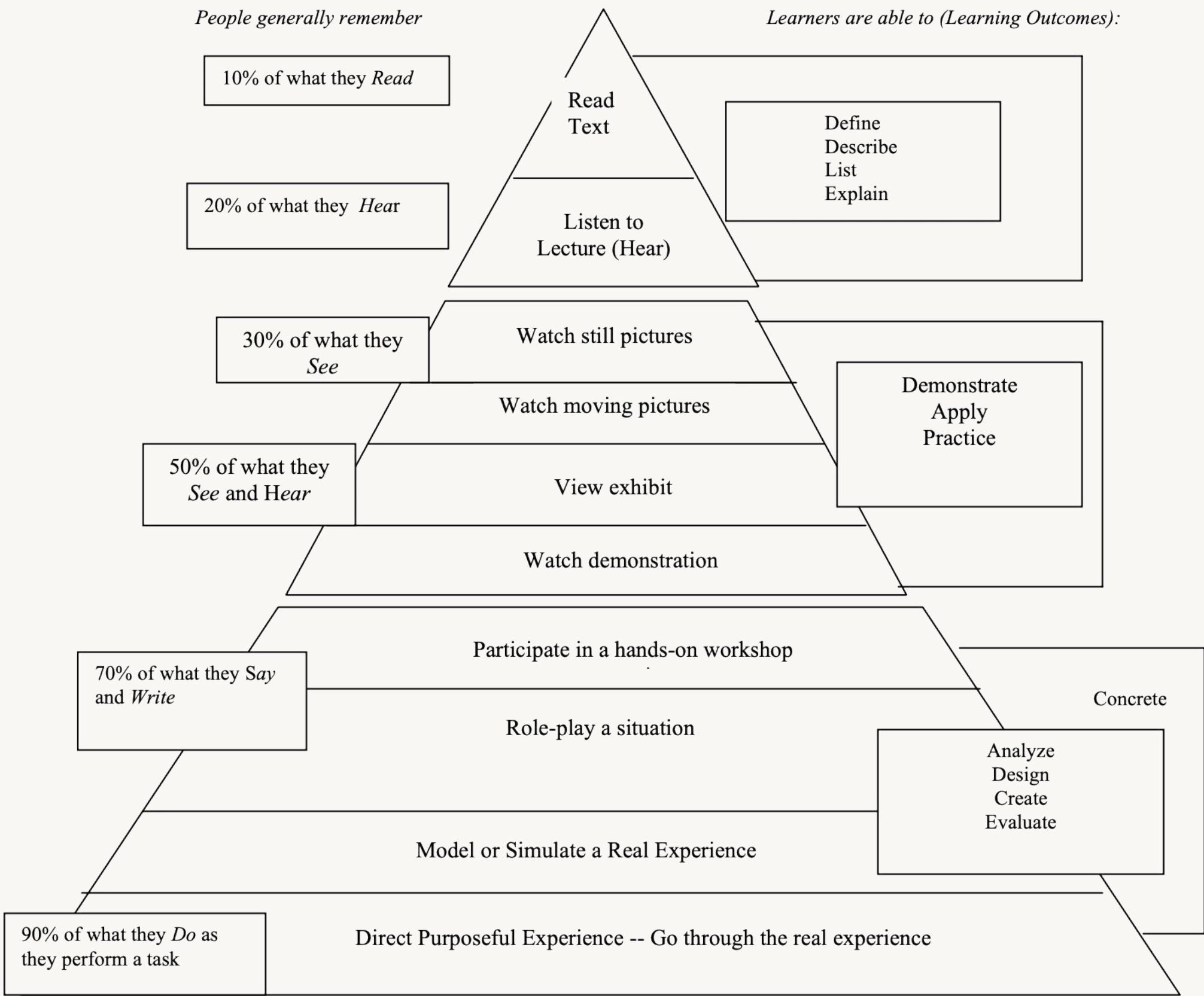


Figure 5.1: Cone of experience by Edgar Dale

“Learning by doing” as represented by John Dewey is best shown in the illustration “cone of experience” by Edgar Dale. Dale’s Cone of Experience is a model that incorporates several theories related to instructional design and learning processes. As this theory also builds on what they “do” as opposed to what is “heard”, “read” or “observed” (Anderson, n.d.).

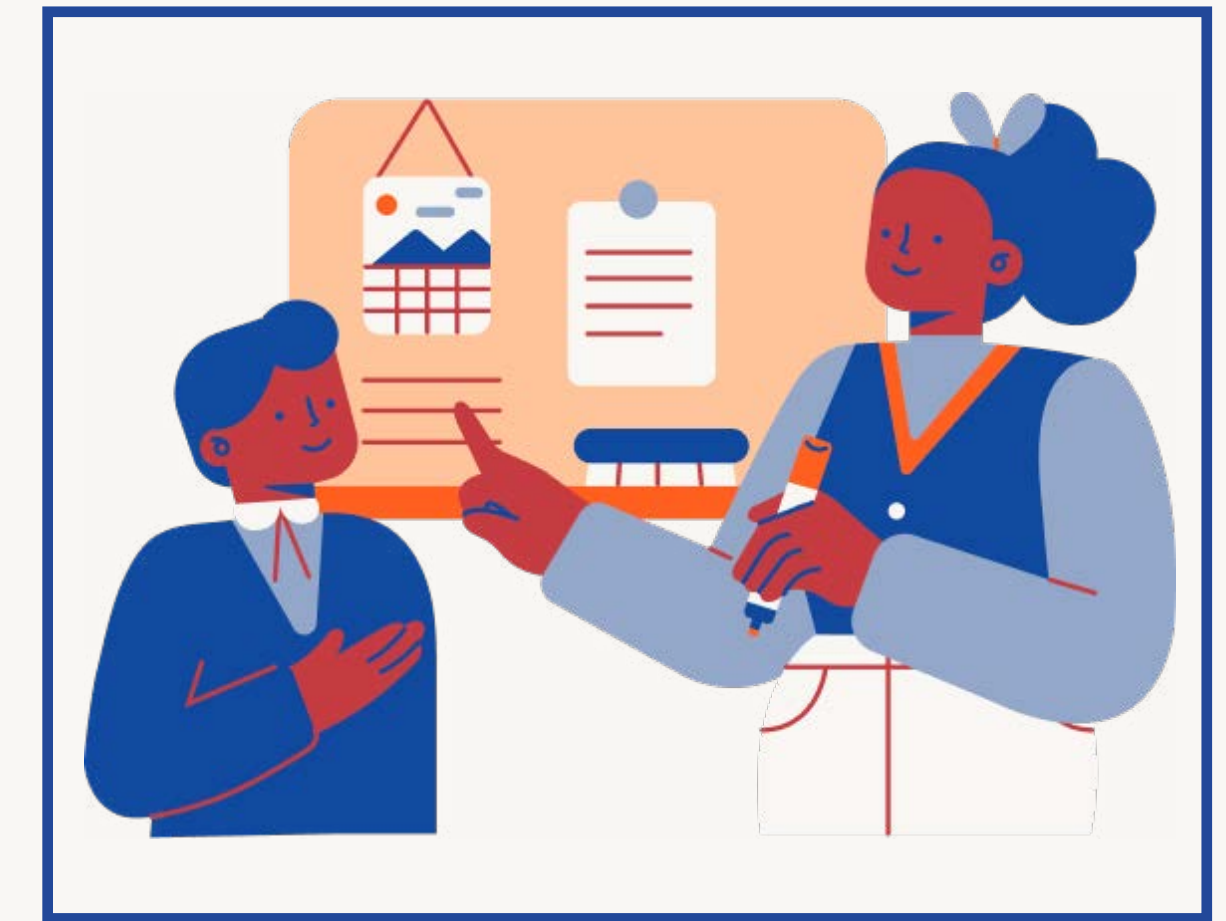
These ladders are showing how to activate learning in different ways, the cone is showing what the outcome of the lessons will generally be. As these parameters are different way of teaching, it does not necessarily mean than any of them are bad, but it should be combined with different learning tools as it will increase the possibility for a better outcome. The goal here is to include as many ‘action learning’ parameters to create an memorable experience and engagement. As engagement will lead to wanting to repeat the experience, because repetitions is considered important when creating new habits. As B.J. Fogg explains in his book ‘tiny habits’, big behavior changes require a high level of motivation that often can’t be sustained. To sustain these changes its important to have repetition of the behaviour to create a new habit. A study done by the European Journal of Social Psychology states

that for an habit to become automatic, it must be repeated from the range of 18 to 254 days (Parker-Pope, 2021).

## THE TWO PARTS OF LEARNING BY DOING

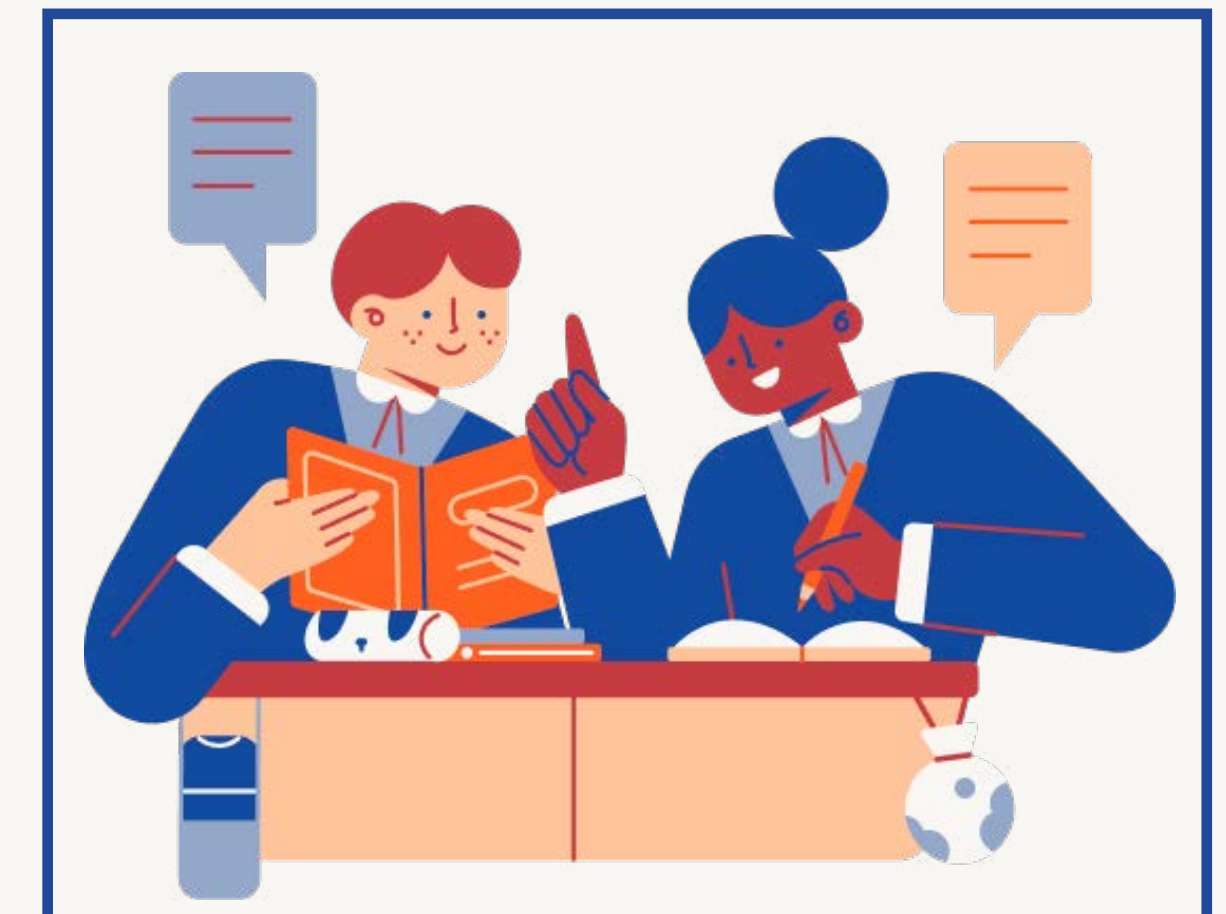
The journey is split into two parts, this is due to the timeframe. As each part require a day for its own. Part one is supposed to happen once as it lays the foundation for implementing the service into their practice. Before they start on part two, they must find out if the teachers should be responsible or if the students should take part in taking care of collecting the food needed for part two. Part two builds on repetition and building the habits into our food practice, the repetition is meant to take place at least one time each month or more often, depending on the school owners. The goal of part two is to teach about how to increase an individual threshold of acceptance and train the senses to assess if the food is edible is consisting of these elements:

### 1 - Demonstrate - create engagement on the topic



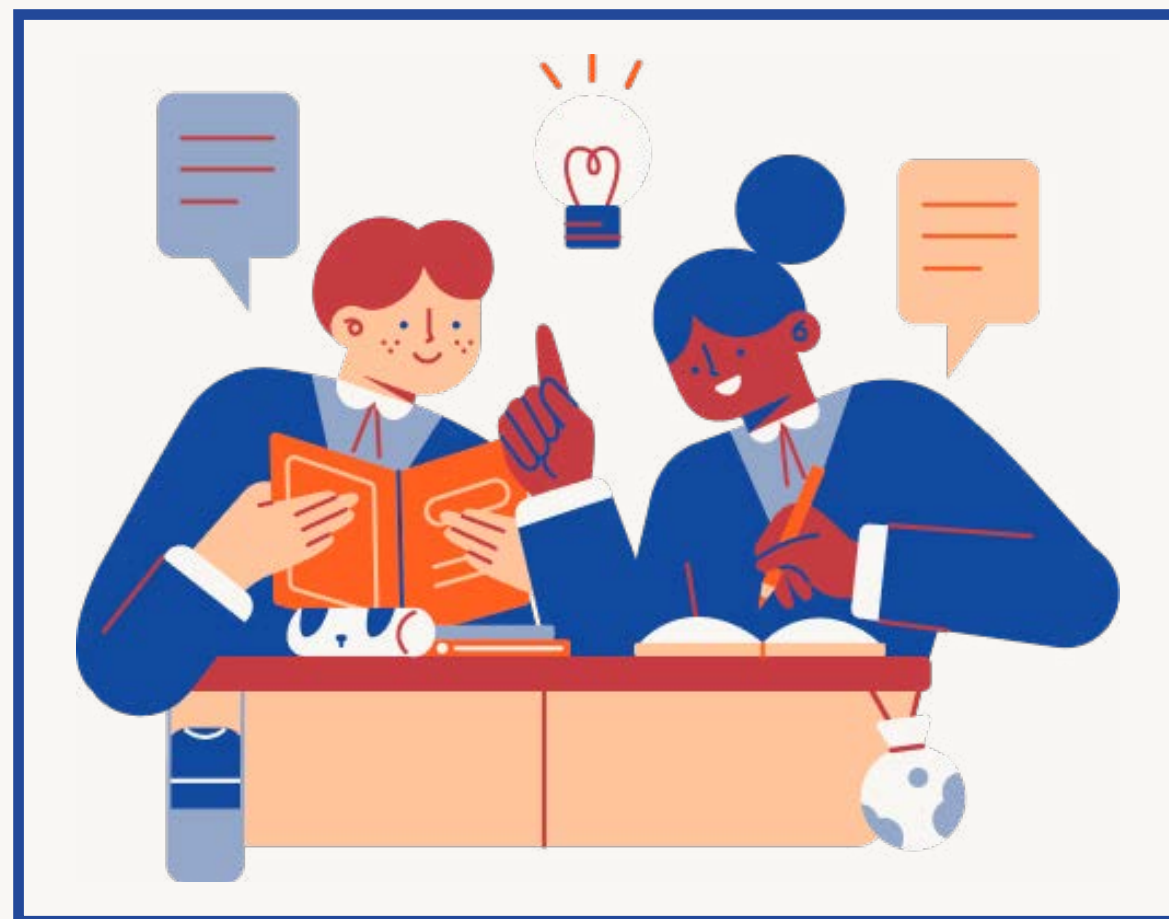
Creating engagement for the topic is first priority, Students remember 50% of what they see and hear (as seen in Cone of Experience). This might be done with movies or pictures of the theme.

### 2 - Analyse - map out food waste sources



The students should discuss where the food waste occurs, as this will map out different contributors of food waste.

### 3 - Create - plan to collect leftovers



The students need to develop a plan for retrieving leftover ingredients they can use in their class. This could be locations with leftovers like the school, their own home, nearby restaurants, nearby producers or nearby supermarket for example.

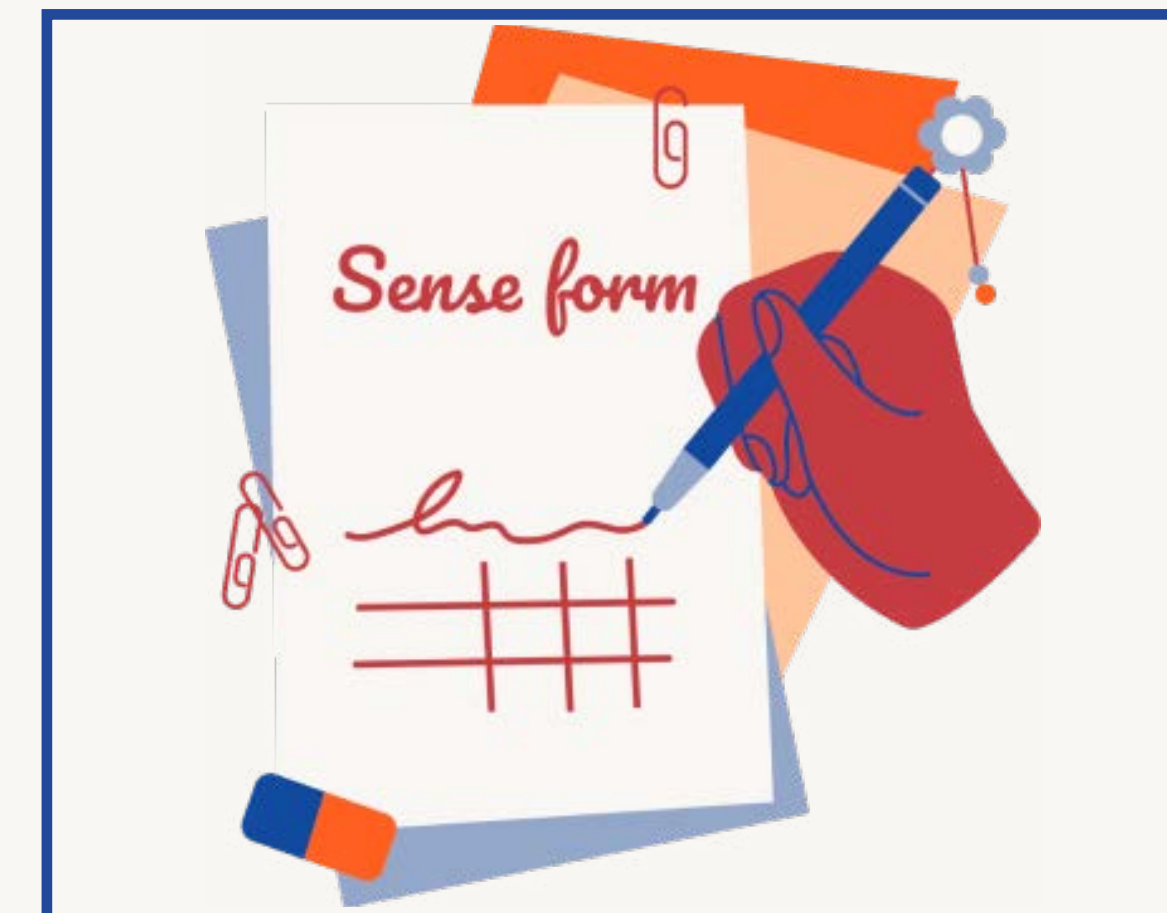
### 4 - Analyse - Recipe bank



Discuss in class what are the students interest in cooking? They should discuss in groups and present suggestions will make a great recipe bank for later in the process when they will need to be creative with leftover ingredients.

## PART TWO

### 5 - Evaluate - Sense form



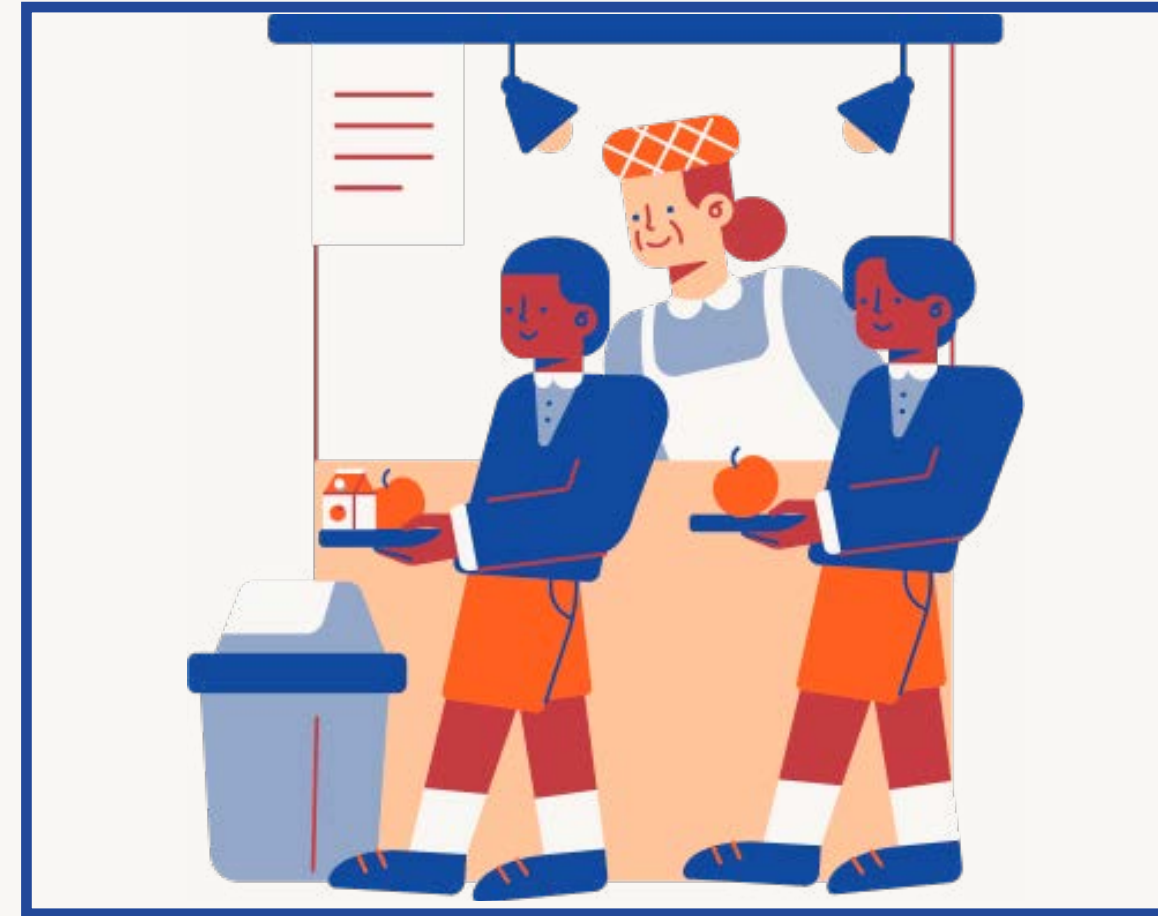
The students will evaluate the food they are using, by using their senses they have to assess if the food is edible or not. At this stage they will be provided with a tool 'sense form' which will help them to evaluate the shape and condition they find the food.

## 6 - Create - Cook the dish



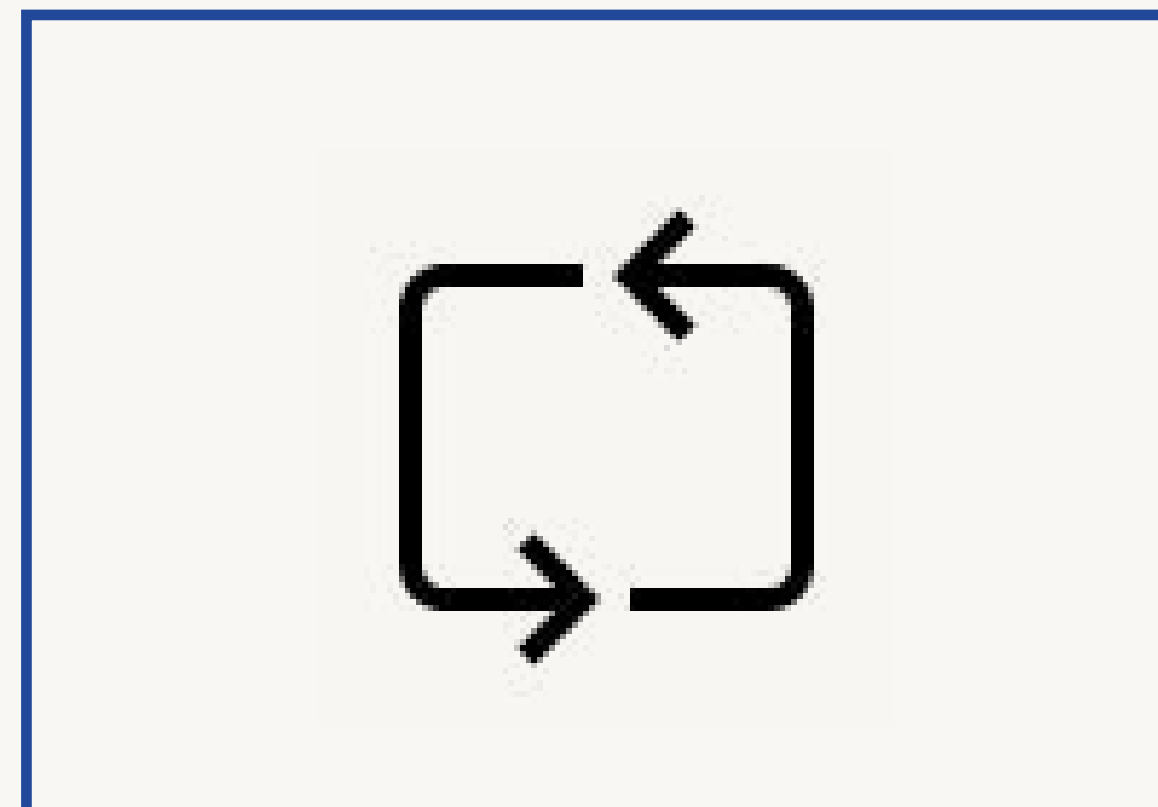
They have to cook and create the dish, here it's important to think about how they can make the dish appealing. Use their recipe bank for inspiration on meals they can cook.

## 7 - Evaluate - Eat and reflect



The students will serve and eat the meals, perhaps trying each others recipes. Reflect and evaluate, what was eye-opening? How much food did they save from being wasted.

And repeat the part two



## ENHANCING KNOWLEDGE

This will set in motion two unconscious processes, one is about creating good experiences on foods that are not qualified to be good enough anymore. The other is about cooks acquiring greater knowledge about how to judge the edibility of food.

## MOTIVATION

This will motivate them to continue with this, as green nudging gives us a better conscience

## IMPLEMENTING NEW BEHAVIORS

Opportunities to create new habits at home, where children can introduce parents to how they evaluate food.

# WHAT CHANGES DOES THIS CREATE?

## Sustainable changes

Well, the effect of this hasn't been tested yet, but since there are so many other great initiatives out there that work to reduce food waste. We can compare with places in Oslo that have used leftover (overskuddsmat) food to reduce food waste. If we look at KUTT Gourmet at Blindern, they save the environment 10 tonnes of food waste a year. They have thus reduced their food waste by 69%, while other Oslo serving places like Tacoteket have reduced by 40% and Deiglig Frederikke by 36% in 2020 (SiO, 2020).

## Changes in our behaviour

To understand what changes are being created in our behaviour, we need to look at the difference before and after. In the first figure, which looks at drivers of food waste. Here we find different causes affecting our behaviour. After the students have acquired the knowledge on how to better judge the edibility of food, they have increased their knowledge on shelf life and reduced the uncertainty they face. In Figure 2 it can be seen what hopeful outcome and how it will affect

the users experience, and how this creates positive feedback loops. This experience has helped to build the sensory evaluations they make, this will change the actions.

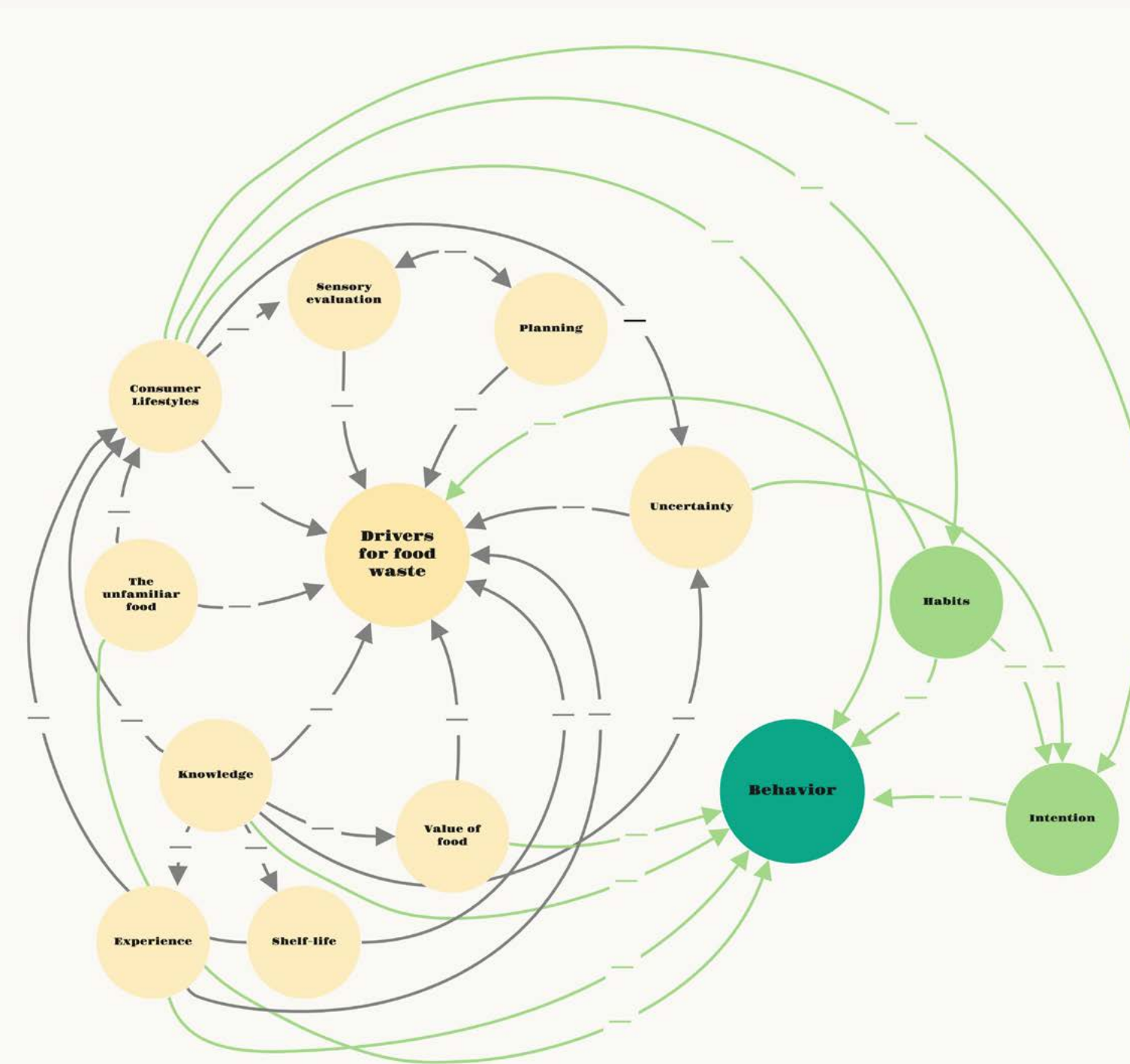


Figure 5.2: Excerpt from the gigamap on what are affecting the drivers for food waste - negative feedback loops.

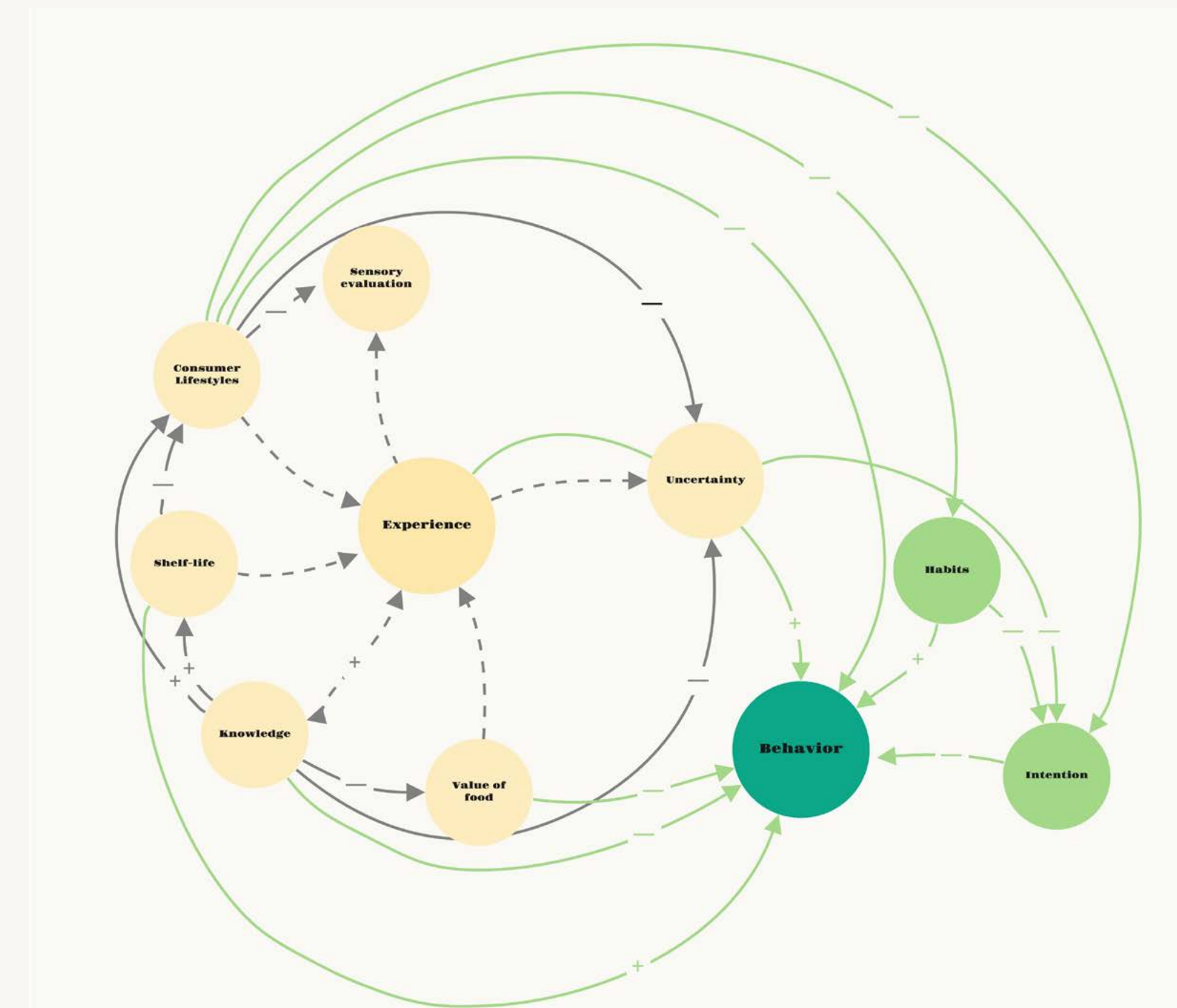


Figure 5.2: Excerpt from the gigamap on what the experience will change, how it is creating positive feedback loops.

# HOW IS THIS INCREASING AN INDIVIDUAL THRESHOLD OF ACCEPTANCE?

Repeated exposures to a food increase their familiarity, and it is one of the primary determinants of its acceptance. According to de Cosmi et al.(2017) its shown that food that are consumed more and is judged as more liked by the infant after several offers. Gordon et al.(2020) is describing information-seeking behavior as “how humans perceive their need for, pursuit of, and use of information”.

It is also important to look at how we evaluate food, all we perceive is what we can call “information”(Gordon et al., 2020). When we see food we interpret it, and make a conclusion about it, then we have processed the information. Food that has a different shape, looks ugly, has a different texture than expected etc. As a consequence, most people avoid the food nowadays, which is why shops and producers nowadays end up throwing away a lot of edible food, despite the fact that the food is perfectly fine on the inside. This service works to lower the threshold for this, by receiving food that is not

suitable as “good enough” from local producers, food centres or grocery stores. Will help expose students from an early age, and nudge them to make more sustainable choices.

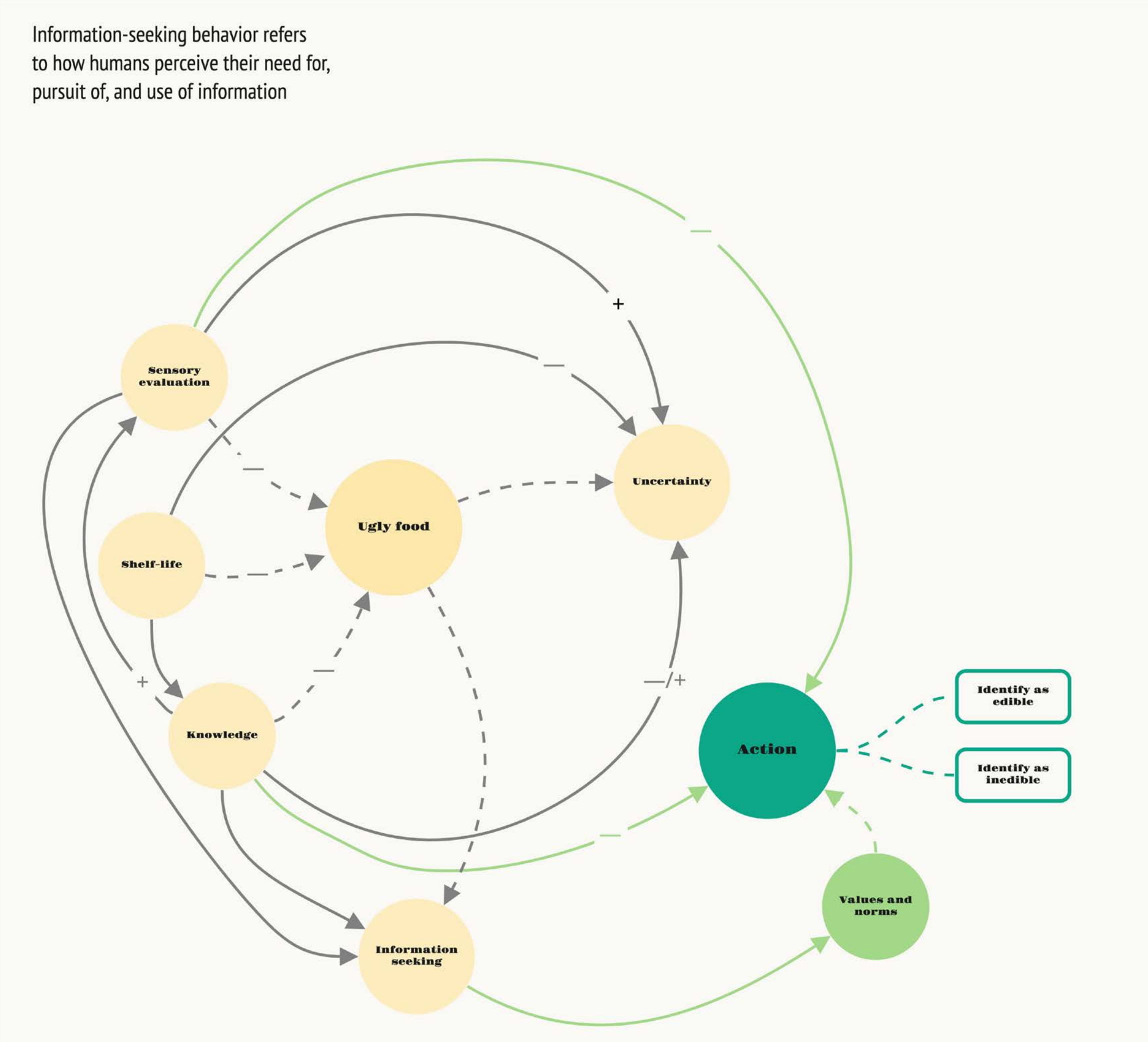


Figure 5.4: Excerpt from the gigamap showing what happens when users are lowering their threshold for “ugly food”.



## WEBSITE

The webpage is a guidance for teacher on how they can construct their class to gain better abilities to understand shelf life and assess if it being fit to eat. As this has become an lost knowledge, it's important to bring it back. To check out the website, copy this link: [Prototype](#)

# The lost knowledge of food – Learn it now!

Learn about how you as an teacher can enchange your students ability to use their senses to contribute to less food waste. Download all the content you need to carry out the teaching.

Let's get started



### Sense form

Introduction on how to use the sense form and why we have it.



### Experience journey

Suggestions on how individual can create threshold for acceptance of ugly and blemish



### Learning outcomes

Which competence goals are in focus. Find out how can this fit into your curriculum

# SENSE FORM

The Sense form page, is a page where you have the option to either download the form or use the interaction buttons directly.

## Sense form

The sense form is develop to be there as an reminder, it works as an repestantion of principles you have to follow in class. Everytime you receive an new ingredients you have to assess the edibility of the food. By using this form over time, the user will develop an habit of constantly checking their food with all the senses.

Criteria	1	2	3	4	5
Eyes: Can you see mold or other changes on the food? Has it changed in appearance or colour?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nose: Does the food smell as it should or does it smell rotten, fermented, sour or in other ways different than it should?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tongue: Does the food taste as expected? Remember that you won't get sick from tasting food that has passed its 'best before' date.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skin: Touch the food. Is it soft when it should be hard or does it feel different in other ways?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Download me



## LEARNING OUTCOME

This is about the learning outcomes, as the subject such as Food and health, science and social studies have targets in their curriculum which are relevant for this service - also mention in chapter 4.

# Learning outcome

Primary school

Middle school

## Food and Health, 8–10 trinn

- Discussed how diet can contribute to good health, and used digital resources to assess one's diet and to choose healthy and varied foods for cooking
- Critically evaluate information about food production and discuss how consumer power can influence local and global food production
- Explore the climate impact of food and explain how food choices and consumption can affect the environment, climate and food security

## Science, 8–10 trinn

- Give examples of and discuss current dilemmas linked to the exploitation of natural resources and loss of biodiversity

# EXPERIENCE JOURNEY

The experience journey pages, is the main part of the service, her its explains how its works, what its based on and how the different steps are.

## Experince Journey

Create an experince - Here we are working on how individuals can create threshold for acceptance of ugly and blemish food. By repeating a pattern, we will create new behavours and habits in our daily life. Therfor its important to create good experiences around ugly and blemish.

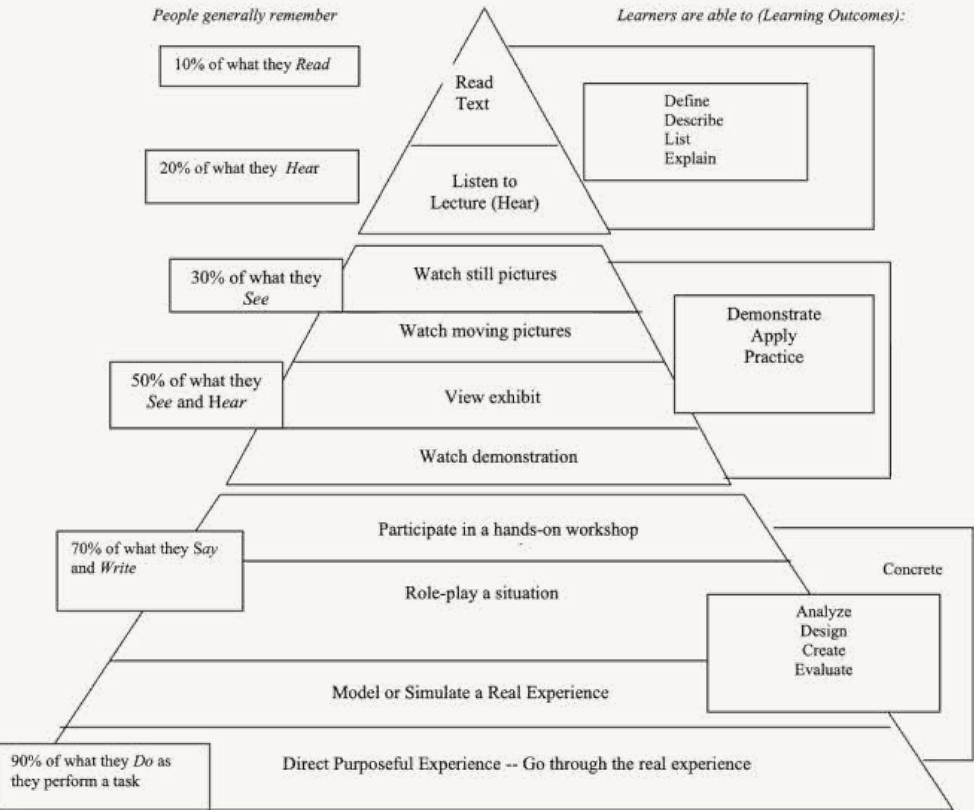
These steps will focus on how individuals can learn to assess the edibility of food through their senses?

These steps build on “learning by doing”, the theory is builds on introducing a problem and get the students into action by solving the problem. To engage the students, it’s important to include their own interests.



## What is “learning by doing”?

Learning by doing is the idea that we learn more when we actually “do” the activity. Therefor this teaching content is building on Dale’s Cone of Experience. This cone is illustrating what we remember from each learning actions. By using this approach, putting the students in the center of the learning and let him do the activities, it would allow a more fun experince for both students and teachers.



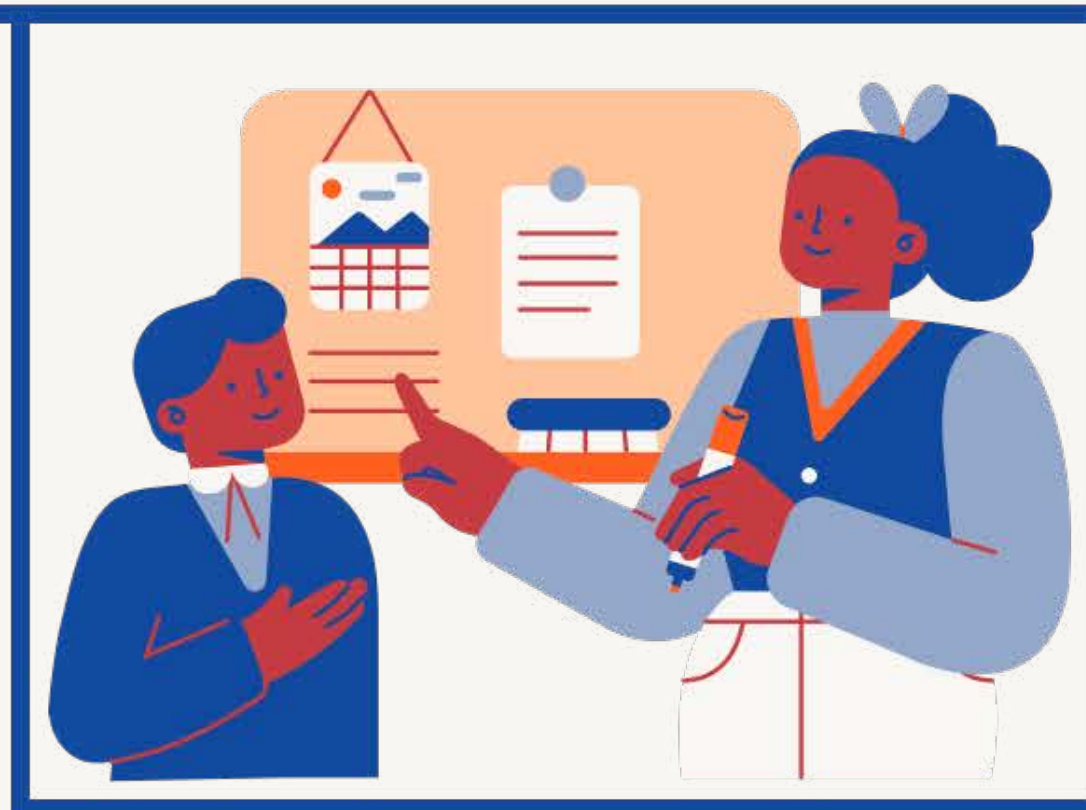
# EXPERINCE JOURNEY

By scrolling down you get a full overview of the different steps in the framework.

## How does it work?

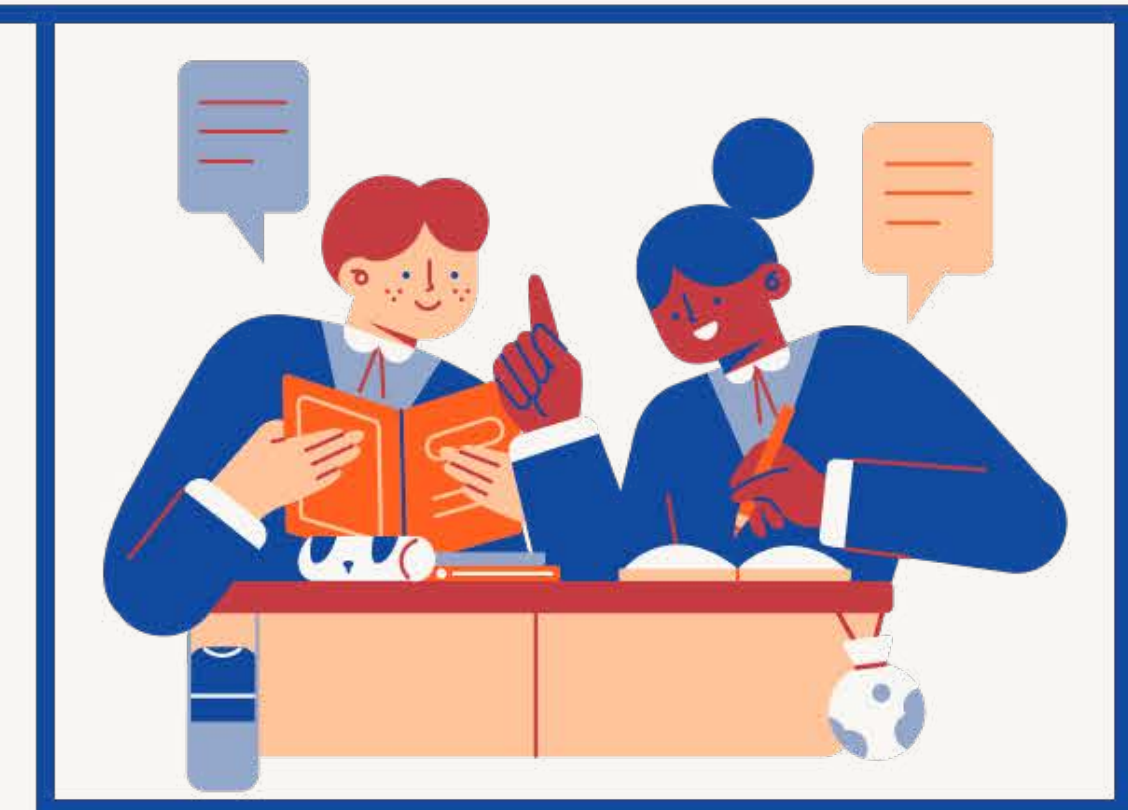
### Part one

1



Creating engagement for the topic is first priority, Students remember 50% of what they see and hear (as seen in Cone of Experience). This might be done with movies or pictures of the theme.

2



The students should discuss where the food waste occurs, as this will map out different contributors of food waste.

# SENSE FORM - WHAT IS IT?

The sense form is developed to be there as a reminder, it works as a repetition of principles you have to follow in class. Everytime you receive a new ingredient you have to assess the edibility of the food. By using this form over time, the user will develop a habit of constantly checking their food with all the senses. As the webpage is also giving you the options to rate the edibility directly in it. This is in case they are only using a digital tool or they don't have access to a printer. If you choose to download the sense form, it would be in A4 format.

Har en vare passert "best før" kan den fremdeles være like god. Det er derfor viktig å bruke sansene for å bedømme om maten kan spises.

## Sanseskjema ditt

Fra skala 1 - 5, hvor 5 er perfekt

Kriterer	1	2	3	4	5
<b>Øyene:</b> Kan du se mugg eller andre endringer på maten? Har den forandret utseende eller farge?					
<b>Nesa:</b> Lukter maten som den skal eller lukter det råttent, gjæret, surt eller på andre måter annerledes enn den skal?					
<b>Tunga:</b> Smaker maten som forventet eller har den en sur eller harsk bismak? Husk at du ikke blir syk av å smake på mat som er gått ut på "best før"-dato.					
<b>Huden:</b> Kjenn på maten. Er den sleip når den ikke skal være det, myk når den skal være hard eller kjennes den på andre måter annerledes ut?					

Husk at selv om du ikke kan bruke alt, så kan du ofte bruke deler av maten.

## Notater:

---

---

---

---



**P.55**

# **Chapter 6**

–

**Conclusion**

## DISCUSSION

This project looks into many important causes of why we as individuals throw food, and what our behavioural drivers are. As is brings up many aspects its shows that this requires a big effort to change things and it will take a long time before things will be perfect. It will require big demands from the industry to nudge users into taking the right decision. For the future it will important to utilize 'Social Proof', which is one of Dr. Robert Cialdini's principles on how to guide human behavior. Social proof is a tool to persuade people when they are uncertain, as they will start to look to the actions and behaviors of others to determine their own (Influence at Work, 2021). How much impact the solution will have will be hard to measure, which due with multiple factors. One has to be with the exposure for food that has actually turned bad, with this solution they will most likely receive food from food centers, supermarket or local producers that has perfectly safe food, but they are not allowed to sell for various reason. This will expose them for the same uncertainty they will meet in their households. What being implied here is not that they are supposed to eat bad food, but once in a while this will happened that you get unsure if its bad or good. In this case it's important to remember

the learning from the sense form, this hopeful outcome for the form is that they bring home and it makes an impact at home. Over time it will be integrated into food practice and it no longer be required to cross of anything on the form, as it becomes an habit. Based on my perception to when it comes to the teachers competence and their intressert in food and health, its seems like many teachers without competence do not care about the curriculum. This is a pitfall for the solution as it requires the teachers to make an effort to find it. Since there is no universal platform for teachers with content they can use today, it will make it harder to reach out to those who feel comfortable with the content they have already. It would be ideal to develop the webpage from the solution into a sharing platform where they could discuss and upload their own interpretation. The solution is well developed for students at middle school level, based on competence goals they have. It would be much needed and relevant to start with green nudging in kindergarten - it will have an impact on our personal values, intention and behavior. As seen in the comprehensive action determination model, the habits being determined by these factors. As habits are generated by repeated action, it is important to generate this perspective into teachers through

kindergarten, primary and middle school. This is in combination with lack of priorities the course is receiving, as is it bad attitude amongst teachers and school owners that this is course is here for provide fun hours at school. With uneducated teacher in the district or teacher who is filling up their position with this course are more than occupied with their own main course. This is why the three interdisciplines teaching themes that got implemented in 2020 are important, as shown earlier - this solution is covering curriculum from food and health, social studies and science. Here schools has the opportunity to combine these three courses and make up for lost school hours in food and health, that often disappear for other reasons.

What is also fascinating to discuss is the rising value of food these days, with the war in ukraine the prices for grain is increasing, and it has already been reported that prices the last year have increased more than they have in the last 30 years. Food prices has not increased much yet, but it will according to Meland (2022). Meland discuss it further and thinks about what has happened since the war: from the moment the seed is planted in the ground, it is more expensive now. Fertilizer, diesel, electricity, transport, employees, packaging



(Meland, 2022). In many ways this could be a good thing, as under the housewife era we used around 40% of our salary on food. As Figure 6.1 explains, our normative processes will have an huge influence as throwing food will make us evaluate the consequences. However this is unethical because even though most people in Norway can afford increased prices of food, that is not the case for the rest of the world

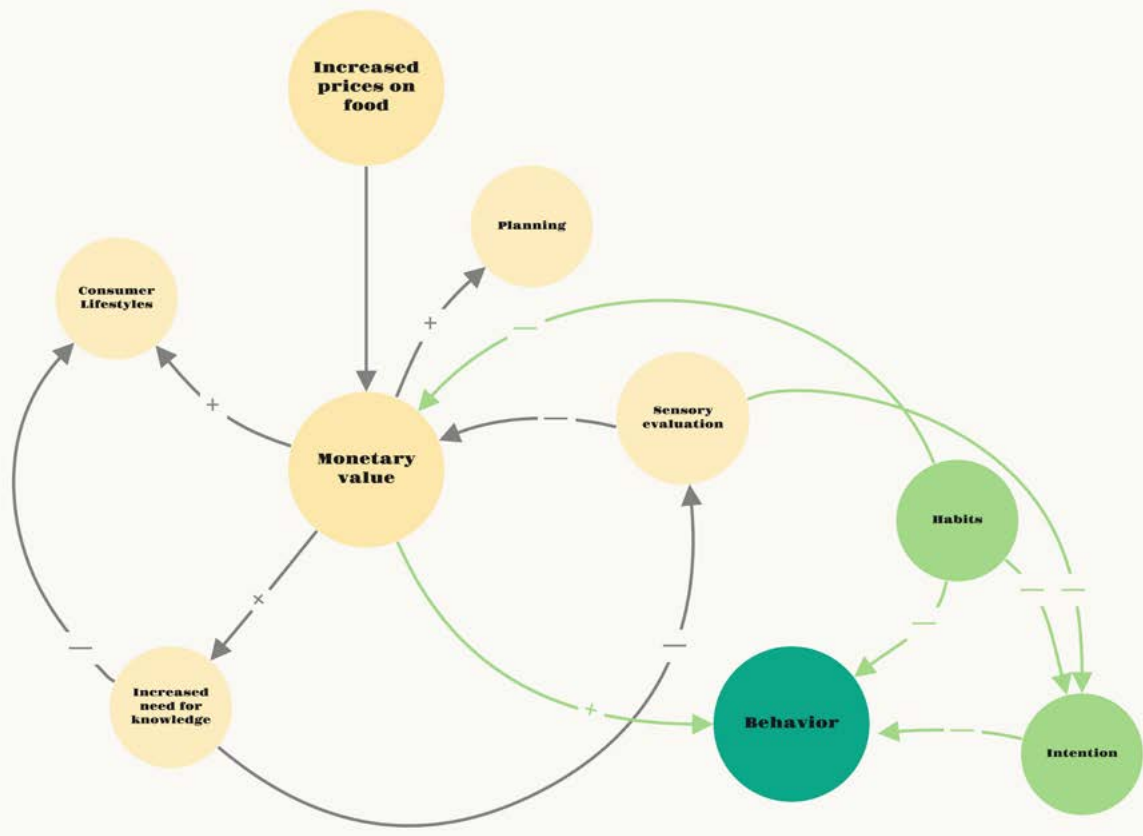


Figure 6.1: Excerpt from the gigamap showing how changes from the war and increased value on can create positive feedback loops.

## CONCLUSION

Integration of the requirements of MUST, SHOULD and OPPORTUNITIES, this service include all

the requirements from MUST. When it comes to SHOULD, this service needs to be more tested more and receive feedback, to be able to develop it further. As for now “Should be independent of the teacher’s competence” is something that is considered as viable for this to work and could be a real treat for now. This is due to the lack of interest teachers without competence show, and might lead to they never find the framework in the first place. When it comes to “Should be adapted to learn to be creative with what you have”, “Should gain more confidence and less uncertainty when evaluating food” and “Should promote the importance of reducing food waste”. This need to be tested to measure the effect over time, but based on behavioral science, it should develop new patterns. When it comes to innovation of the service, it’s clear when Norsus et al.(2020) highlighted competence development in schools and kindergartens. Started the initiative such as educational tools and resources from ‘Too good to go’ and ‘Loop Miljøskole’, these two initiative was something I found in the very end and again highlight the importance for an official platform.

As the design solution is the experience itself and the framework to carry it through, it’s believed that this will contribute value to our normative

processes, as it will affect the social norms, personal norms, awareness of need and awareness of consequences. For further work, it needs to be studied what the effect of creating an good experience around a certain setting is adding. As this concept is not something that is only valuable for schools, this is something that could be implemented into plenty of food practices. As the restaurant REST in oslo, is creating an similar experience. On their webpage they say “No great ingredient should be left behind. Rest. is a rejection of modern consumerism. We turn food waste into a fine dining experience”(Restaurant Rest, n.d.). As well as mentioned before Sio has been doing waste campaigns where their canteens sell leftovers. All of this is contributing to us as individual to lower our threshold on “unwanted food”. It would also be important to do further research on what the students associate with shelf life and find out how to create variation in the framework. The motivation may fall from repeating the same pattern over and over, it’s a threat for receiving many of the similar ingredients every time depending on the agreement they make in the first part of the service.

# REFERENCE LIST

- » Anderson, H. M. (n.d.). Cone of Experience [Illustration]. Are. <https://www.are.na/block/3726687>
- » Arsky, G. H., Borchenius, C., Fulland, C., & Hammeren, R. (2021). Mat og helse 8–10 fra Cappelen Damm (1st ed.). Cappelen Damm AS.
- » Aschemann-Witzel, J., de Hooge, I. E., Almlı, V. L., & Oostindjer, M. (2018). Fine-Tuning the Fight Against Food Waste. *Journal of Macromarketing*, 38(2), 168–184. <https://doi.org/10.1177/0276146718763251>
- » Bashir, H. (2021, October 5). Flere fluer i én smekk: Grønn dulting for bærekraftig kundeatferd. *Econa*. <https://nye.econa.no/faglig-oppdatering/medlemsbladet-magma/5-2021/flere-fluer-i-en-smekk-gronn-dulting-for-barekraftig-kundeatferd/>
- » Blaasvaer, L., & Sevaldson, B. (2019). EDUCATIONAL PLANNING FOR SYSTEMS-ORIENTED DESIGN: APPLYING SYSTEMIC RELATIONSHIPS TO META-MAPPING OF GIGA MAPS. *Design Society*. <https://doi.org/10.35199/epde2019.40>
- » de Cosmi, V., Scaglioni, S., & Agostoni, C. (2017). Early Taste Experiences and Later Food Choices. *Nutrients*, 9(2), 107. <https://doi.org/10.3390/nu9020107>
- » FN. (2022, February 17). Utrydde sult. <https://www.fn.no/om-fn/fns-baerekraftsmaal/utrydde-sult>
- » Gordon, I. D., Cameron, B. D., Chaves, D., & Hutchinson, R. (2020). Information Seeking Behaviors, Attitudes, and Choices of Academic Mathematicians. *Science & Technology Libraries*, 39(3), 253–280. <https://doi.org/10.1080/0194262x.2020.1758284>
- » Goyal, M. (2016, March 19). How diets of single men and women differ from their married counterparts. *The Economic Times*. <https://economictimes.indiatimes.com/magazines/panache/how-diets-of-single-men-and-women-differ-from-their-married-counterparts/articleshow/51473749.cms>
- » Gynther, K. (2016). Design Framework for an Adaptive MOOC Enhanced by Blended Learning: Supplementary Training and Personalized Learning for Teacher Professional Development. *Semantic Scholar*. <https://www.semanticscholar.org/paper/Design-Framework-for-an-Adaptive-MOOC-Enhanced-by-Gynther/3e0e93b17d83e12138e31db464780f76eb331f68>
- » Hebrok, M., & Heidenstrøm, N. (2017). *Maten vi kaster – En studie av årsaker til og tiltak mot matsvinn i norske husholdninger*. Oslo: Forbruksforskningsinstituttet SIFO. <https://oda.oslomet.no/oda-xmlui/handle/20.500.12199/5337>
- » Iberdrola. (n.d.). “Learning by doing”, a methodology to boost in-company training. <https://www.iberdrola.com/talent/learning-by-doing>
- » Influence at Work. (2021, November 9). Dr. Robert Cialdini’s Seven Principles of Persuasion | IAW. <https://www.influenceatwork.com/7-principles-of-persuasion/>
- » Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—A meta-analysis. *Global Environmental Change*, 23(5), 1028–1038. <https://doi.org/10.1016/j.gloenvcha.2013.05.014>
- » Knutsen, F. H. (2021). AN ETHICAL APPROACH TO THE IMPLEMENTATION OF BEHAVIOURAL SCIENCE IN THE DESIGN PROCESS. *DS 110: Proceedings of the 23rd International Conference on*

Engineering and Product Design Education (EPDE 2021). <https://doi.org/10.35199/epde.2021.37>

- » Knutsen, F. H. (2022). HOW FEATURES OF TODAY CAN SHAPE OUR FOOD SHOPPING AND EATING HABITS IN THE FUTURE. OsloMet.
- » Lassen, K. (2020, January 3). Erfaringer fra samarbeid om mat og helsefaget med Regionalt fagnettverk midtre Buskerud, sett med en faglærers blikk [Slides]. Universitetet i Sørøst-Norge. <https://www.hvl.no/contentassets/e804692ac5cc40de9bf603473a44b843/mat-og-helsefaget-karen-lassen-usn.pdf>
- » Lassen, K. (2022, January 7). mat og helse. Store norske leksikon. [https://snl.no/mat\\_og\\_helse](https://snl.no/mat_og_helse)
- » Learning by doing - en aktiv prosess. (2012, October 16). PPU - Læringsteori. <https://aktivprosess.wordpress.com/2012/10/16/learning-by-doing-en-aktiv-prosess/>
- » MatPrat. (2019, November 4). 4 grunner til at matsvinn er et miljø- og klimaproblem. <https://www.matprat.no/artikler/matsvinn/4-grunner-til-at-matsvinn-er-et-miljo--og-klimaproblem/#:%7E:text=Matsvinn%20representerer%20un%C3%B8dvendig%20bruk%20av, senere%20i%20forbindelse%20med%20avfallsh%C3%A5ndtering.&text=Klimagassutslippene%20fra%20matsvinn%20er%20h%C3%B8yere, unntak%20av%20Kina%20og%20USA>
- » MatPrat. (2020, May 29). 7 matsvinnfakta. <https://www.matprat.no/artikler/matsvinn/7-matsvinnfakta/>
- » Matsentralen. (n.d.). Matsentralen Norge - Hva er matsvinn? <https://www.matsentralen.no/matsvinn>
- » Mattilsynet. (2019, November 11). Holdbarhetsmerking på matvarer | Mattilsynet. [https://www.mattilsynet.no/mat\\_og\\_vann/merking\\_av\\_mat/generelle\\_krav\\_til\\_merking\\_av\\_mat/holdbarhetsmerking\\_paa\\_matvarer.2711](https://www.mattilsynet.no/mat_og_vann/merking_av_mat/generelle_krav_til_merking_av_mat/holdbarhetsmerking_paa_matvarer.2711)
- » Matvett. (n.d.). Tall og fakta. [https://www.matvett.no/bransje/tall-og-fakta#:%7E:text=Selv%20om%20matbransjen%20samlet%20ligger,%25\)%20og%202030%20\(50%20%25\).](https://www.matvett.no/bransje/tall-og-fakta#:%7E:text=Selv%20om%20matbransjen%20samlet%20ligger,%25)%20og%202030%20(50%20%25).)
- » Matvett & Østfoldforskning. (2015). ForMat prosjektet - forebygging av matsvinn. Matvett. [https://www.matvett.no/uploads/documents/ForMat-prosjektets-sluttrapport\\_180105\\_134627.pdf](https://www.matvett.no/uploads/documents/ForMat-prosjektets-sluttrapport_180105_134627.pdf)
- » Meland, A. (2022, May 12). Dette kommer folk til å merke. Vg. <https://www.vg.no/nyheter/meninger/i/g69n9J/dette-kommer-folk-til-aa-merke>
- » Muratovski, G. (2015). Research for Designers (1st ed.). SAGE Publications Ltd.
- » Norsus. (2021). Kartleggingsrapport undervisning for og omsorgssektoren matbransjen, og forbruker leddet. <https://www.matvett.no/uploads/documents/OR.48.21-Kartleggingsrapport-for-matbransjen-undervisning-og-omsorgssektoren-og-forbrukerleddet.pdf>
- » Norsus, Stensgård, A. E., & Callewaert, P. (2021). Sektorrapport for matbransjen, offentlig sektor og husholdningsleddet. Norsus. <https://norsus.no/publikasjon/sektorrapport-for-matbransjen-offentlig-sektor-og-husholdningsleddet/>
- » Norsus, STENSGÅRD, A. E., PRESTRUD, K., & CALLEWAERT, P. (2020). Matsvinn i Norge - Rapportering av nøkkeltall 2015–2019. Norsus. <https://norsus.no/en/publikasjon/matsvinn-i-norge-rapportering-av-nokkeltall-2015-2019/>
- » Nyhammer, E. (2021, December 14). Nudging — hvordan kan du bruke adferdsdesign til å løse samfunnsutfordringer? Medium. <https://medium.com/comte/nudging-hvordan-kan-du-bruke-adferdsdesign-til-%C3%A5-l%C3%B8se-samfunnsutfordringer-9c3b2c4a8c2c>
- » Parker-Pope, T. (2021, June 7). How to Build Healthy Habits. The New York Times. <https://www.nytimes.com/2020/02/18/well/mind/how-to-build-healthy-habits.html>
- » Ravensborg, M. B. (2018). Gråte over spilt melk? OsloMet - Storbyuniversitetet. Institutt for Sykepleie Og Helsefremmende Arbeid. <https://oda.oslomet.no/oda-xmlui/handle/10642/6151>
- » Regjeringen. (2021, August). Hovedrapport 2020 – Bransjeavtalen om reduksjon av matsvinn. <https://www.regjeringen.no/no/dokumenter/bransjeavtalen-om-reduksjon-av-matsvinn->

- » Ren, P. P., Qian, Z. C., & Sohn, J. J. (2020). Learn to Cook for Yourself: Employing Gamification in a Recipe App Design to Promote a Healthy Living Experience to Young Generation. Lecture Notes in Computer Science, 458–470. [https://doi.org/10.1007/978-3-030-50164-8\\_34](https://doi.org/10.1007/978-3-030-50164-8_34)
- » Restaurant Rest. (n.d.). Waste not. Want not. <https://www.restaurantrest.com/>
- » Sandvik, C., Helland, M. H., Ask, A. S., Aarek, I., & Aadland, E. K. (2021, February 20). Mat og helse inn i skolen. Dagsavisen. <https://www.dagsavisen.no/debatt/2019/10/29/mat-og-helse-inn-i-skolen/>
- » Sevaldson, B. (2011). GIGA-Mapping: Visualisation for complexity and systems thinking in design. Nordes 2011: Making Design Matter. <https://doi.org/10.21606/nordes.2011.015>
- » Siazon, D. (2022, March 3). How food connects us all. Medium. <https://medium.com/@deussamuelsiazon/how-food-connects-us-all-e1a13a8f9acc>
- » SiO. (2020). Vi kutter matsvinnet vårt! SiO.
- » Skogedal, M. N. (2021, October 1). Mye mat og lite helse i mat- og helsefaget. Forskning.no. <https://forskning.no/mat-og-helse-partner-pedagogikk/mye-mat-og-lite-helse-i-mat--og-helsefaget/1913120>
- » Stockholm Resilience Center. (2016, June 14). The SDGs wedding cake. <https://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html>
- » Systems Innovation. (2020, September 1). Iceberg Model. <https://www.systemsinnovation.io/post/iceberg-model>
- » Tharaldsen, O. P., & Bringsli, H. (2016). Hvilken matkaste tilhører DU? NorgesGruppen ASA. <https://www.norgesgruppen.no/globalassets/finansiell-informasjon/rapportering/ng-mag-matnyttig-2016-web-oppslag.pdf>
- » The Interaction Design Foundation. (2015, November 18). Making Your UX Life Easier with the MoSCoW. <https://www.interaction-design.org/literature/article/making-your-ux-life-easier-with-the-moscow>
- » UN Inter-agency Group for Child Mortality Estimation. (2020). Levels & Trends in Child Mortality. United Nations. <https://www.un.org/development/desa/pd/news/levels-and-trends-child-mortality-2020-report>
- » United Nations. (n.d.). Goal 12 | Department of Economic and Social Affairs. United Nations - Department of Economic and Social Affairs Sustainable Development. <https://sdgs.un.org/goals/goal12>
- » Utdanningsnytt. (2010, September 23). Læreplanverket for Kunnskapsløftet (LK06) 2006. Utdanningsnytt.no. <https://www.utdanningsnytt.no/kunnskapsloftet-laereplaner/laereplanverket-for-kunnskapsloftet-lk06-2006/152447>
- » Valvik, M. E. (2013, June 24). Vi bruker langt mindre av inntekten på mat. Aftenposten. <https://www.aftenposten.no/okonomi/i/zLRE4/vi-bruker-langt-mindre-av-inntekten-paa-mat>

**P.61**



**FREDRIK HOPE KNUTSEN**