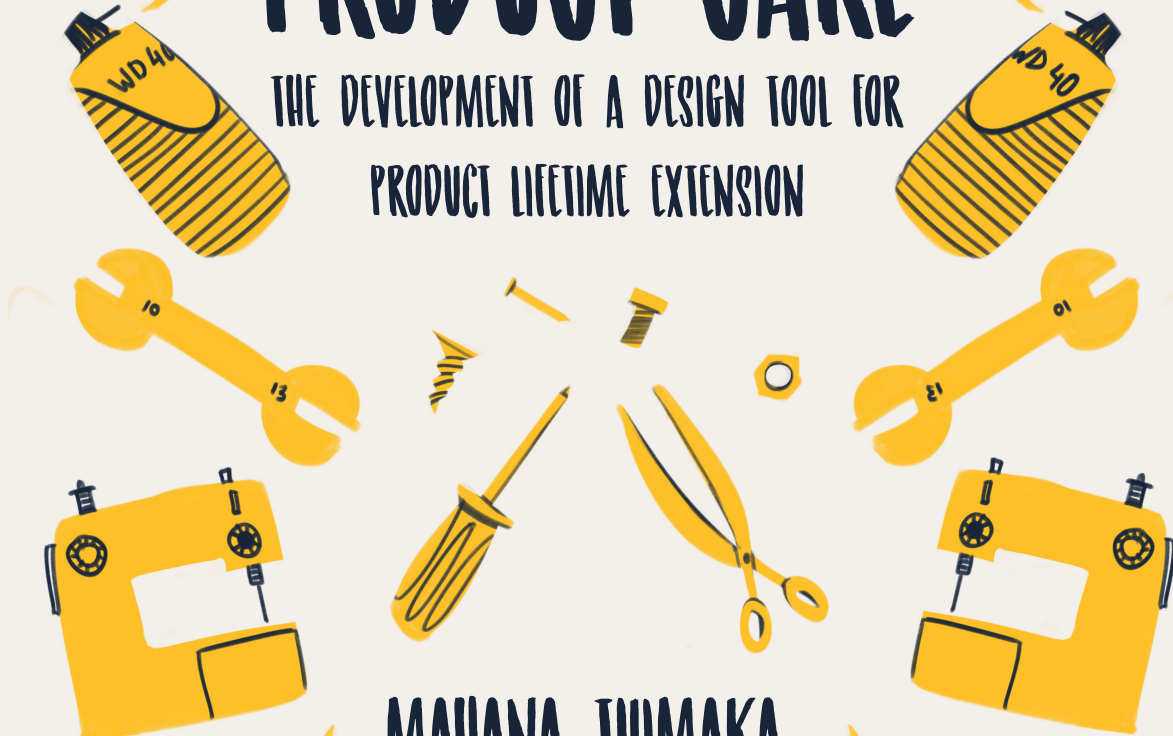




# DESIGN FOR PRODUCT CARE

THE DEVELOPMENT OF A DESIGN TOOL FOR  
PRODUCT LIFETIME EXTENSION



MAHANA TUIMAKA







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**Master thesis**

Design for Product care

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Mahana Tuimaka

Delft University of Technology

Faculty of Industrial Design Engineering

**Graduation committee**

*Chair*

Prof. dr. ir. Ruth Muge

*Mentors*

Dr. Dipl.-Des. Stella Boess - mentor

Dr. ir. Anna Pohlmeier - mentor

Ir. Laura Ackermann - mentor



# EXECUTIVE SUMMARY

To realize the shift towards a Circular Economy, products should stay usable as long as possible. Maintaining products is the most efficient way of retaining their desired level of performance. This is called Product care. Product care can be understood as any action that helps to prolong the lifetime of a product.

The aim of this thesis is to explore how designers can stimulate users to perform product care activities. This goal has been reached through a practice-based approach and connecting it with strategies from existing literature. This took place at the University of Technology Delft.

The context of Product care and the product care behavior of end-users have been researched through a diary study, a micro-emotion scan, creative sessions with design students and literature regarding repair and maintenance. This revealed two things, there are 7 types of product care and each user has a different profile regarding their skills, motivations and barriers. This shows that analyzing which type of product care you are aiming for and defining your specific user are essential requirements.

To develop design strategies for Design for Product care various methods were used. A brainstorm session with designers was held to develop product solutions that stimulate product care. An ideation session was held by myself and real product examples were collected that already stimulate Product care. The product solutions were used to cluster into design strategies. The clustering process led to 8 design strategies: *experiences, enabling,*

*informing, change, reflecting, social, control and appropriation.*

These can be linked to existing strategies and theories regarding Circular, Emotion-centered and Behavioral design.

To transfer the knowledge about the design strategies to designers a design tool was developed. The process was iterative and the 2 biggest iterations were tested with design students and designers. These tests showed that a few important criteria for the test were that it should teach the designer about the different types of product care, the design strategies and they should take the type of user and product into consideration. The tool needs to provide a sense of structure, and still be flexible to fit everyone's process. It should provide examples of how a design strategy is implemented into a design.

The final tool is the Product Care Kit, a set of magnetic cards used for brainstorming, ideating and discussing. It presents the most important factors which influence Product care. The set consists of the following cards: persona cards, product cards, product care type cards, design strategy cards and example cards with product solutions for each design strategy. This tool helps to analyze and understand the context which you are designing for. It helps to create conceptual design ideas for product care.

In the future this tool should be further evaluated with designers in practice and taught to design students. The outcomes of the tool should be validated by end-users. The tool can potentially lead to sustainable care behavior and lead to physically and emotionally durable products.



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# TABLE OF CONTENTS

<b>1</b>	<b>Introduction</b>	<b>p. 12</b>
	1.1 Background	p. 13
	1.2 Circular economy	p. 13
	1.3 Product care	p. 15
	1.4 Design challenge	p. 15
<b>2</b>	<b>Literature review</b>	<b>p. 18</b>
	2.1 Introduction	p. 19
	2.2 Product lifetime	p. 20
	2.3 Eco-driven/Circular design strategies	p. 22
	2.4 Behavioral design strategies	p. 26
	2.5 Emotion-centered design strategies	p. 32
	2.6 Emotionally durable design	p. 36
	2.7 Design education	p. 37
	2.8 Chapter conclusions	p. 38
<b>3</b>	<b>Empirical research</b>	<b>p. 40</b>
	3.1 Introduction	p. 41
	3.2 Micro emotion scan	p. 42
	3.3 Creative sessions with design students	p. 46
	3.4 Product care types	p. 48
	3.5 Diary study	p. 50
	3.6 Chapter conclusions	p. 54
<b>4</b>	<b>Development strategies</b>	<b>p. 56</b>
	4.1 Introduction	p. 57
	4.2 Brainstormsession designers	p. 58
	4.3 Individual ideation session	p. 60
	4.4 Existing products and services	p. 62
	4.5 Clustering into design strategies	p. 64
	4.6 Chapter conclusions	p. 70



# TABLE OF CONTENTS

<b>5</b>	<b>Development design tool</b>	<b>p. 76</b>
	5.1. Introduction	p. 77
	5.2. Process	p. 78
	5.3. Iteration walkthrough template	p. 82
	5.4. Requirements	p. 87
	5.5. Iteration brainstorm card set	p. 88
	5.5. Chapter conclusions	p. 96
<b>6</b>	<b>Final design</b>	<b>p. 100</b>
	6.1. Introduction	p. 101
	6.2. Product care kit	p. 102
	6.3. Tool's results	p. 108
	6.4. Chapter conclusions	p. 112
<b>7</b>	<b>Reflections</b>	<b>p. 114</b>
	7.1. Introduction	p. 115
	7.2. Discussion	p. 116
	7.3. Recommendation	p. 118
	7.4. Personal reflection	p. 120
	<b>References</b>	<b>p. 121</b>
	<b>Appendix</b>	<b>p. 124</b>

# 1

# INTRODUCTION

This chapter elaborates on the goal and main research questions of this research. It will elaborate on some background information to illustrate the need for Design for Product Care.



# 1. INTRODUCTION

## 1.1 Background

Over the years, multiple studies and reports have tried to make us consumers face the facts: our materialism has put a strain on the resources that are delivered by the world that we live in (The Guardian, 2011). The scarcity of resources will be a huge problem in the future for production and it will become more and more valuable to bring back these resources into production. With 7 billion people on the planet and more on the way, the demand and need for resources will grow as well. The truth is, whether we like it or not, that we cannot continue this all-consuming behavior and our behavior needs to change.

*‘But how could I do anything about an issue so great?’* you may think. The most powerful people in this matter are people controlling the big industries. Their decisions on design, production, and marketing of the products they sell will have a big impact on (or will determine) the sustainability of these products. In this thesis, I will try to convince you that you, as a designer or as a user can also have an impact. You decide the way you live, the choices you make and the behaviors you perform. And I am not expecting you to completely turn around the way you live or to only buy recycled or biodegradable

products. That’s unrealistic to ask of anyone. What I’m asking you is to slightly change your habits when it comes to the products you own. To take an extra minute a day, to ensure that the products you have, stay in the circular loop a little longer.

This graduation project started with the PhD research of Laura Ackermann (Ackermann, 2018). To contribute to this project, I set myself the challenge of developing design strategies and a design tool for Product Care. Later in this chapter, I will elaborate on Product Care.

## 1.2 Circular economy

The world we know currently runs as a linear economy (Government of the Netherlands, n.d.; Sariatli, 2017). A linear economy is defined by a ‘*make, use, throw*’ mentality, where raw materials are made into products, are used by consumers and eventually thrown away to end up in landfills or incinerators (Sariatli, 2017). The result of this linear economy is that increasing quantities of resources are necessary to support the production, the amount of waste is piling and pollution has met an all-time high. When humanity achieved the industrial revolution there was a shift in the way products were produced

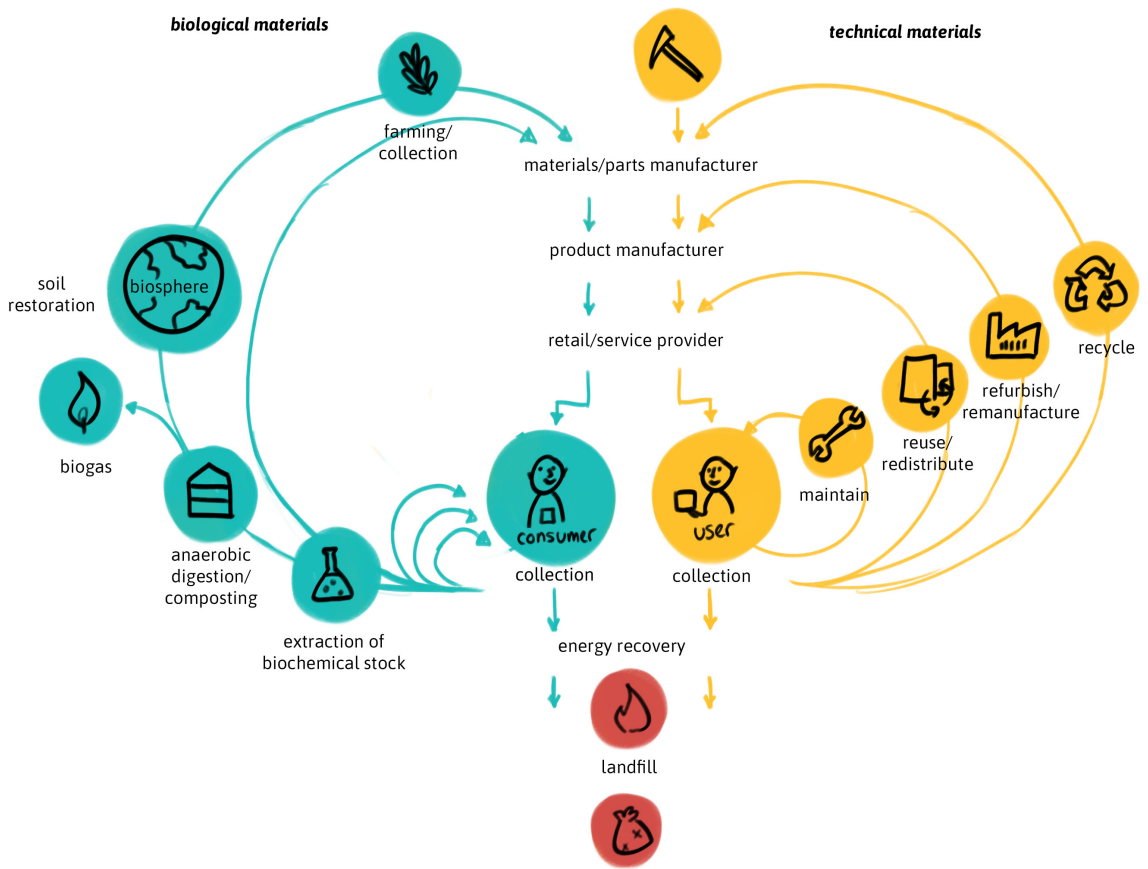


Fig 1.1.1. Butterfly diagram by Ellen MacArthur Foundation

and treated and this had a revolutionizing effect on people's lifestyles and comfort in a positive way. But this also brought along the concepts of disposable products, fast fashion and planned obsolescence (Guiltinan, 2009; London, 1932). This planned obsolescence was preached by London to fight the great depression in the thirties and to create work power and bring back the standard comfort that he felt everyone should have. Even though it might have helped pull countries out of depression and create jobs and change lives, this type of economy cannot stand with the rapid increase in population and growing need for more resources.

The European Commission published a list of 27 critical materials (European Commission, 2017), that are being strained under the current system.

As early as 1966 (Boulding, 2011; Sauvé, Bernard & Sloan, 2016) systems similar to the circular economy were spoken of. Of open loop (circular) systems instead of closed-loop systems (linear). The circular economy focuses on slowing down the resource flow, and closing and narrowing down material loops (The Ellen MacArthur Foundation, 2015. See Fig. 1.1.). This can be achieved through maintenance, repair, reuse, remanufacturing, refurbishing and

recycling.

But completely changing the system of how our economy works and realizing this shift to a durable and sustainable economy, is a difficult and long process. Industries over the world together, have to change the way they work, to make this possible. So knowing this, what is already possible to contribute to this shift?

One person, a consumer, a user, can already look into their own habits and behaviors and see how they can behave more sustainably. For a circular economy, the world not only needs sustainable production and products, it also desperately needs sustainable behavior (Green, Ryder, Monaghan & Levett, 2006).

## 1.3 Product Care

To realize the shift towards a Circular Economy, products should stay usable as long as possible. Not only products should be produced in a sustainable way but also consumers' behavior towards products should be sustainable. Maintaining products is the most efficient way of retaining products' their desired level of performance, according to the Circular Economy System Diagram.

The throwaway culture that we live in has made it often far easier to throw away products and buy new ones, instead of maintaining and repairing the things we have. But by evoking behavior of the consumer that persuades or stimulates them to maintain or repair their belongings, the lifetime of products can be extended and thus can be considered more

sustainable. Therefore, if we want to be able to gradually move towards a circular system it is vital to include in this strategy the way products are being cared for. This is Product care.

Product care can be understood as any action that helps to prolong the lifetime of a product, such as maintenance or repair (Ackermann, 2018; Ackermann, Mugge & Schoormans, 2018). These product care activities can be conducted by the consumer itself or by a service, like a garage, or a bike shop. Product care is the smallest loop of the butterfly diagram of the Ellen MacArthur Foundation and is the most effective way to keep resources in the loop.

## 1.4 Design challenge

Laura Ackermann's PhD research centers the topic of Product care. It led to this Graduation Project for the master Design for Interaction at the Technical University of Delft. Our standpoint is that Product care should play an essential part in the shift towards a Circular Economy and that design plays an essential role in facilitating consumers to perform more product care.

As you may understand, the responsibility of product care does not fully lie with the consumer. Consumers have the power of performing Product care behavior. The design however, could be the underlying force which stimulates that behavior. Designers should design products in a way so that users are able and willing to perform product care activities, replace parts, clean it, repair it and more. The final force that ensures that the product receives

care is the user, but designers can facilitate the user in doing so.

This brings us to the following: in general, industrial designers are not trained in designing for Product care. There is limited data available about Product care, but there exist many strategies that relate to designing for durable products, be it through circular design or emotion-centered design strategies.

There are however a few downsides, the first is that these design strategies are often still new and haven't been implemented in the standard design cycle (van Boeijen, Daalhuizen, Zijlstra & van der Schoor, 2013; Eger & Bonnema, 2010) of designers yet. Another problem is that these design strategies often exist on a theoretical basis, but are currently not being implemented in practice. This may be partially due to the format in which this information exists. I believe that designers need concrete information and strategies to be able to implement these new insights and information in their designing process.

My aim is to enable designers to design products and/or services that stimulate product care behavior by the consumer. I want to do this by developing a tool that designers can use during their design process. This tool should give them the necessary knowledge regarding Product care and the ability to implement this in their design. With this, I hope that consumers are made aware of the way they treat their products and feel encouraged to make their belongings last longer.

### **Main research question:**

*How can a designer stimulate a user to perform Product care activities?*

This can be answered by answering the following sub-questions:

- *What is Product care?*
- *How can Product care behavior be stimulated through design?*
- *What do designers need to be able to implement Product care into their design?*





# 2

# LITERATURE REVIEW

This chapter will present existing design strategies, theories and dimensions that can have an impact on designing for Product Care. Strategies from Circular Design, Emotion centered-design and Behavioral design will be discussed. Finally, some insights will be given regarding design education and its role in sustainable design which will have an influence on the development of the Product care design tool.





# 2.1 INTRODUCTION

In this chapter, I delve into literature for answers on the main research question: *How can a designer stimulate a user to perform Product care activities?*

During the literature review, attention is paid to all sub-questions:

- *What is Product care?*
- *How can Product care behavior be stimulated through design?*
- *What do designers need to be able to implement Product care into their design?*

To answer these questions I will delve into the after-effect of Product care, product lifetime extension. To be able to extend or optimize this product lifetime, many researchers have already come with interesting strategies.

Product care itself is not yet a popular topic, but many strategies relate to circular design and specific product care behaviors such as repair and maintenance. These strategies may prove to be fruitful for Design for Product care.

In this literature review, I will be looking at strategies from three different branches:

- *Circular design strategies and eco-strategies that focus on physical*

*durability*

- *Emotion-centered strategies that focus on emotional durability*
- *Behavioral design that focuses on designing for behavioral change*

The overarching strategy between eco- or circular design and emotion-centered design is emotionally durable design (Chapman, 2015), which describes the strive for a physical and emotional extension of a products' lifetime. I will briefly dive into the two directions before diving into Emotionally Durable Design.

To answer the last question, '*What do designers need to be able to implement Product care into their design?*' this chapter will also take a brief look at design education. This will be important during the development of the design tool in Chapter 5. To be able to develop a design tool that fits into the design process of a designer, it is important to know how designers work and which methods they are familiar with.

# 2.2 PRODUCT LIFETIME

## **Most effective and least energy-consuming loop**

Looking into existing literature can help understand the topic of Product care: the benefits, the bottlenecks and strategies that might support designers in successfully designing for product care. As said before, Product care is part of the smallest loop of the Circular Economy Model (The Ellen MacArthur Foundation, 2015) which proposes to keep products as long in the loop as possible. This means a product will go through multiple cycles of maintenance, repair, reuse, distribution, refurbishment, manufacturing and eventually recycling. By making the product go through these loops multiple times, the resource use flow can be slowed down, waste can be minimized, a product's lifetime can be extended and its resources can be utilized more efficiently. The smallest loop represents maintenance: maintenance is the most effective and least energy-consuming loop of the Butterfly diagram.

The success of the inner circles depends heavily on the consumer's behavior and perception towards the product. Durability, ease of maintenance, long-life guarantee, modularity, variability, classic design and a strong person-product relationship can help when developing product lifetime

extension strategies (Mugge, Schoormans & Schifferstein, 2005). At the moment, design is not focused on ease of repair and maintenance. If designs would facilitate repair and maintenance, it might be easier for consumers to do so.

## **Usage phase**

Another thing that needs to be considered is the active use-phase. Product lifetime extension is desirable when this means that the resources are kept in the loop longer, but also that users keep using it longer. What often happens, is that users replace their still functioning products with newer versions. The old one is stashed away and its resources are not brought back into the loop. Macleod (2017) created an overview that shows what the consumer-product lifecycle looks like. It starts with the consumer getting to know the product, where the engagement rises and it ends with the engagement declining and the consumer disposing of the product. For Macleod's graph, see Fig. 2.2.1. What I aim for in this Graduation project is that the *usage phase* in between on- and off-boarding is extended and that when Product care is no longer an option, the product's resources are brought back into the loop.

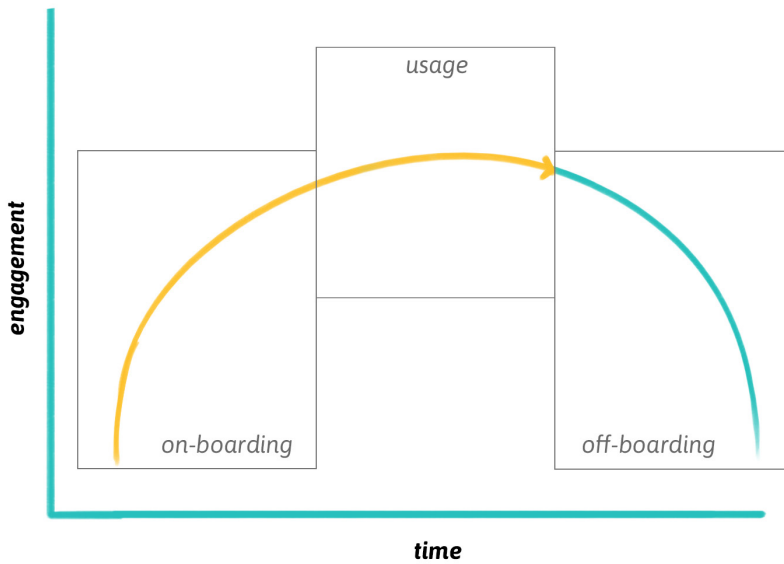


Fig 2.2.1. Consumer experience broken into three phases by Joe Macleod

Although it is important to consider the end-of-life behaviour, in this study I will focus on the earlier phases and how to evoke product care. Therefore, this end-of-life (Wikipedia, 2019) behavior will not be taken into account during this thesis.

It is interesting to look at how the experience of the first part of the consumer-product experience can be re-created. It is also interesting to make the user see their relationship with their belongings as something that can evolve and continue to grow into something new, ensuring that the off-boarding phase is postponed.

### **Product lifetime optimization**

Earlier, product lifetime extension was mentioned (Bakker, Wang, Huisman & den Hollander, 2014; Bocken, de Pauw, Bakker & van der Grinten, 2016). What should also be taken into consideration is that this is not the case for all products, some products such as refrigerators should be replaced at a certain point of time since

their replacements are often far less energy consuming (Bakker, Wang, Huisman & den Hollander, 2014). What should be strived for is product lifetime optimization (van Nes & Cramer, 2006), prolonging the use-phase of a product until replacing becomes more sustainable than extending lifetime.

### **Key insights**

Even though product lifetime optimization is the most desired outcome, it is out of the scope of this thesis. However, it is interesting to look at in future researches. Literature about product lifetime gives a clear understanding of why product care is a useful and vital force.

After diving into product lifetime extension, a first few ideas for possible design strategies to evoke Product care arose. A possible strategy that might be derived from this is to create a new high in their user-product experience, that postpones the decline of engagement. For example, by creating a user-product relationship and/or experience that evolves and changes over time.

# 2.3 ECO-DRIVEN/ CIRCULAR DESIGN STRATEGIES

## **Design for product longevity from the book *Products that last***

There are some good examples of sustainable design strategies that focus on maintaining value over a longer period of time and prolonging product life. In this chapter six strategies will be touched upon which are all proposed by Bakker & den Hollander in their book *Products that Last* (2014).

The following strategies are presented:

- *Design for Durability*
- *Design for Standardization and Compatibility*
- *Design for Upgradeability and Adaptability*
- *Design for Dis- and Reassembly*
- *Design for ease and repair*
- *Design for Attachment and trust*

*Design for Durability* sounds to be an obvious strategy. It is defined as designing products that can handle wear and tear. Products are usually tested a numerous amount of times before and after they are released on the market. During these tests researchers can already make an assumption of how for example an IKEA dresser will perform even after opening and closing its drawers for 20.000 times. This is very hard to test though since

one must be able to predict beforehand what kind of workload the product will go through during its lifetime. This is a possible strategy, but there are downsides to it: it will take time and is done when the designing process is in its later stages. There is a risk that it does not hold up against the demands of use and designers have to go back to the drawing board. It is an interesting strategy if it is possible to make a simulation of regular use but also peak and unexpected use. Unfortunately this is not always possible to simulate digitally. This strategy may be difficult to substantiate in a design tool.

*Design for Standardization and Compatibility* is looking at what is already designed and making your product compatible. Instead of designing every little screw or using new resources, make use of existing parts and products. This also makes it easier for users to replace or fix parts when necessary. See Fig 2.3.1. This toolkit is a basic toolkit that contains the most common needed tools for repairs or maintenance. An ideal design based upon this strategy should be able to be fixed by using this kit. This is an important strategy to keep in mind, especially for the design of more complex products where spare parts are needed for product care, these need to



Fig 2.3.1. IKEA toolkit. Many people have this as a starter toolkit (especially students)



Fig 2.3.2. Phoneblocks, a modular phone

be easy to obtain.

The strategy *Design for Upgradeability and Adaptability* allows a product to be modified and expanded on in the future. Change is happening and being able to respond to those changes can make a product last longer in this world. Designers will have to develop scenarios for what a product's lifespan is going to look like. Possible reactions to these changes could, for example, be software updates, changeable, addable modules or a complete change of use and functionality due to the change of needs of users over time. A nice example of a product for this strategy is *Phoneblocks*, see Fig 2.3.2. This modular phone is easy to upgrade and customized according to the user's changing needs.

It can be a very important strategy for product care. A consumer changes over time and it is very beneficiary if the product is able to change with them or is handed down to the next generation or user after a few adjustments. This strategy focuses not only on the physical durability of the product, where worn out or outdated parts are replaced, it also focuses on the emotional durability of a product, where people see a product as an entity with growing and evolving possibilities.

Another strategy is *Design for Dis- and Reassembly*. As the name suggests it proposes designs that are easy to disassemble and reassemble. The important part from an eco-design perspective here is the result of the disassembly. For eco-design, it is important that after disassembly parts will always be able to be put together again, again and again and

that they will always fit. This should not be confused with products that are easy to assemble and disassemble.

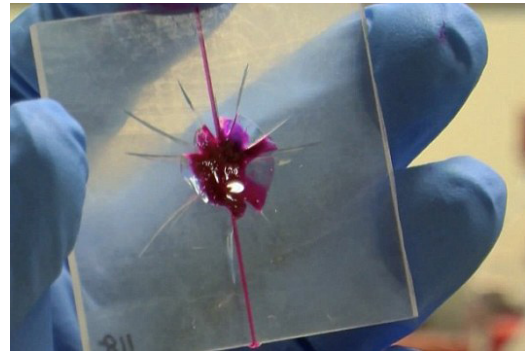
Many IKEA pieces, when disassembled, feature ugly holes where once screws sat and it cannot be reassembled as firmly as it was before. IKEA beds and couches are probably the only exception to this issue. If it is necessary to disassemble it to perform a certain type of product care, Design for Dis- and Reassembly can be very important.

*Design for Ease of Repair and Maintenance*, targets the same niche that this thesis targets with Design for Product Care. When properly applied, this strategy should enable the user to maintain the product in an excellent condition. It proposes that product design currently often limits repair and maintenance. Designers ought to design the product in a way that enables users to open up their products and clean and replace parts. Whereas before there would be a big warning sticker saying not to touch anything. An extreme example is regenerative plastics, see Fig 2.3.4. These plastics regenerate themselves when damaged. This would be the ultimate solution to product care: a product that would heal itself. But this is not realistic, and not applicable for all products. Most products will still need a form of human product care.

Design for Ease of Repair and Maintenance is an essential strategy for Product care and every design should comply to this. Every consumer product that is vproduced



*Fig 2.3.3. Tomado shelving system, a shelving system that is known for being easy to reassemble into different ways of use*



*Fig 2.3.4. Regenerative plastics. Materials are being developed that can regenerate itself, even after a bullet being shot at it*



*Fig 2.3.5. My personal smartphone*



should be easy to maintain or repair if possible. What this theory lacks is that even if the product allows repair and maintenance it is not guaranteed to happen from the user's side.

The book *Products that Last* also presents a strategy that is seen as a strategy of Circular Design, but is also a strategy for Emotion centered design. This is *Design for Attachment and trust*. It focuses on creating an emotional bond between the user and product. This shows that in the world of Circular Design they are aware of the importance of the user's emotional connection with the product. Examples of products that rely on this strategy are products that people become personally attached to, which encourages them to handle it more carefully, and results in people often not replacing it. A personal example of a product that complies to this strategy is my smartphone, a Huawei. It supports me in so many ways, keeping in contact with friends, being my alarm clock and calendar, my entertainment, my camera, my news channel. For many people a smartphone is something that they want to upgrade and get a new one every year. I however, would not want to replace it. It is not the physical form which I have grown attached to, but to the services it provides and how easy the interactions have become.

### **Key insights**

The book *Products that Last* (Bakker & den Hollander, 2014) explains the different strategies from the Circular Design viewpoint. All of the previously mentioned strategies are beneficial for Product care.

The very first step of product care should be making it possible and accessible to perform product care. One way or another these strategies all focus on this.

Design for Durability, as said before, may be a bit difficult to combine in a design tool together with the other strategies. It can be a strategy that is already interesting on itself, something that a designer should always take into consideration. *How to make a product that can take wear and tear?*

This is also very dependent on the user's behavior, their intended and unintended use of the product. Design for durability is something that should be taken into account in all cases.

All strategies, apart from Design for Attachment and Trust, have a thing in common. They do not take the intricate user-product relations and interactions into account. They are targeting product design but are not taking the consumer's emotions and behaviors into consideration. Product lifetime extension is not a product design that can be designed, it is what the designer tries to facilitate and the user is invited to act upon.

# 2.4 BEHAVIORAL DESIGN STRATEGIES

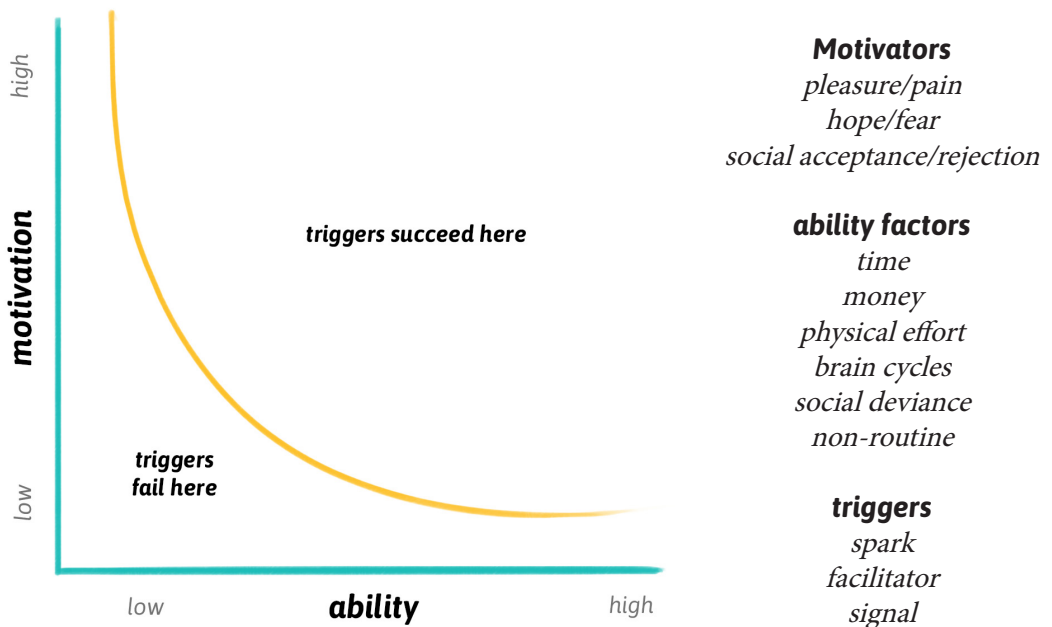


Fig 2.4.1. Fogg's behavioral model

Designing for Product care can only be successful if the design not only makes it able for users to perform Product care and persuades or motivates the user to do so. In other words, a behavioral change.

## Fogg's behavioral model

One of the starting points for the research about this was Fogg's Behavior Model (Fogg, 2009), see Fig. 2.4.1. Fogg shows in his behavioral model the three main factors that influence behavior change: *Motivation*,

*Ability* and a *Trigger*. All three parts are necessary for a user to be able to make a change in their behavior.

He mentions the core motivators for the factor *Motivation*, which have a positive or negative influence on the person's willingness to perform a certain behavior: pleasure/pain, hope/fear, and social acceptance/rejection.

The factors that make up *Ability* are time,



Identified factors of motivation, ability and triggers.

	Factor	Definition
motivation	financial aspects	high price of the product high price of spare parts
	pleasure	fun or joy provided by the product
	functionality	high functionality and therefore regular use of the product
	aesthetics	concerns very aesthetically appealing products
	intrinsic motivation	general attitude towards longevity
	rebellion against the brand policy	consumers' reaction as the brand tries to prohibit them from repairing their products
ability	irreplaceability	emotional attachment, for example, because product is a heirloom
	fit with participant's identity	product represents consumer's lifestyle
	shared ownership	other people owning the product leads to a decreased feeling of responsibility for the product
triggers	knowledge and skills	consumer knows how to take care of the product
	time and effort	consumer has enough time for taking care
triggers	lack of tools	consumer has no access to suitable tools
	general lack of repairability	the fact or the assumption that a product cannot be repaired in general
	appearance triggers	product does not look nice anymore
	time triggers	care activity after a certain amount of time, independent from the actual state of the product
	social triggers	influence of the social environment, such as family or friends
	previous care activity experiences	previous care activity was positive
	challenge-based approach	consumers want to try out what they can do by themselves and where their personal boundaries are

Fig 2.4.2. Ackermann's expansion on Fogg's behavioral model

money, physical effort, brain cycles, social defiance and non-routine. Ability factors are seen as the simplicity of the behavior. The simpler the behavior is perceived, the higher a person rates on ability. For every person the simplicity profile differs. For example, a retired citizen may score high on time and money and have difficulty with physical effort and non-routine, while a high school student may score very low on the first two, but will not be stopped by physical effort or non-routine behaviors.

The third factor *Triggers* exists of sparks (heightening motivation), facilitators (heightening ability) and signals (a reminder). Without a trigger, no matter how high the motivation and ability, a person will not act and change their behavior.

Fogg advises to use his behavioral model because it may help to systematically

dissect behavior and to discover which factor is lacking when targeting a certain behavior change. This model may be a simplified version of the mental processes that happen in the user's mind. It can be an accessible and understandable tool for designers to understand the key ingredients of behavioral change without having to have in-depth knowledge of the human mind.

Ackermann (2017) expands on Fogg's model through a study on people's product care behavior and proposes an expansion on the determinants provided by Fogg, see Fig 2.4.2. Some determinants will not be easy to incorporate into a design tool, since they are difficult to influence by the designer, such as financial aspects or intrinsic motivation. Those determinants can still be inspirational factors to keep in mind when tackling product care behavior.

## Design for sustainable behavior

Bhamra and colleagues (2011) already explored design intervention strategies for a field called Design for Sustainable Behavior, which tries to influence consumers behavior in order to reduce negative social and environmental impacts. Essentially, this is what Design for Product care is.

Design intervention strategies presented by Bhamra and colleagues were:

- *Eco-information*
- *Eco-choice*
- *Eco-feedback*
- *Eco-spur*
- *Eco-steer*
- *Eco-technical intervention*
- *Clever design*

The interventions range in the control they give to the consumer over their behavior, from Eco-information being purely informative, to Eco-technical intervention forcing the desired behavior upon the user, see Table 2.4.1.

To get an idea of how these strategies are expressed in a design I will provide a



Fig 2.4.3. *Never hungry caterpillar* by Matthias Laschke & Marc Hassenzahl

few existing product examples. The first is the *Never Hungry Caterpillar*; it is an extension cable for electrical devices with a standby mode. When, for example, a TV is on, the caterpillar moves slowly, as if breathing. When the device is turned off and left in standby mode it writhes and moves as if in pain. If the TV is unplugged, the caterpillar is still, as if in sleep. It makes the user think about their energy behavior and touches upon the tendency to be kind and caring towards a 'living' being. It is a nice example of the intervention strategy



Fig 2.4.4. *Keymoment*, by Matthias Laschke, Marc Hassenzahl & Claudius Lazzeroni

Eco-choice. The user is encouraged to think about their behavior, provided with options and has to take responsibility themselves.

Another example, that would fit for this intervention strategy is the design *Keymoment*. When the bike key is taken, nothing happens. When the car key is taken, it drops the bike key to the ground. The user is left with the choice, pick it up or leave it? Take the car or take the bike instead? This design was originally developed to encourage users to be more physically active, but it is also a good encouragement to be more sustainable and

Table 2.4.1. Design intervention strategies by Bhamra, Lilley & Tang (2011)

### Eco-information - design oriented education

**Aim:** to make consumables visible, understandable and accessible to inspire consumers to reflect upon their use of resources

**How it works:**

1. Product expresses the presence and consumption of resources e.g. water, energy etc.
2. Product encourages the user to interact with resource use.

### Eco-choice - design oriented empowerment

**Aim:** to encourage consumers to think about their use behaviour and to take responsibility of theirs actions through providing consumers with options.

**How it works:**

Users have a choice and the product enables sustainable use to take place.

### Eco-feedback – design oriented links to environmentally/socially responsible action

**Aim:** to inform users clearly about what they are doing and to facilitate consumers to make environmentally and socially responsible decisions through offering real-time feedback.

**How it works:**

The product provides tangible aural, visual, or tactile signs as reminders to inform users of resource use.

### Eco-spur – design oriented rewarding incentive and penalty

**Aim:** to inspire users to explore more sustainable usage through providing rewordings to 'prompt' good behaviour or penalties to 'punish' unsustainable usage.

**How it works:**

The product shows the user the consequences of their actions through 'rewarding incentives' and 'penalties'.

### Eco-steer – design oriented affordances and constraints

**Aim:** to facilitate users to adopt more environmentally or socially desirable use habits through the prescriptions and/or constraints of use embedded in the product design.

**How it works:**

The product contains affordances and constraints which encourage users to adopt more sustainable use habits or reform existing unsustainable habits.

### Eco-technical intervention – design oriented technical intervention

**Aim:** to restrain existing use habits and to persuade or control user behaviour automatically by design combined with advanced technology.

**How it works:**

The product utilises advanced technology to persuade or control user behaviour automatically.

### Clever design

**Aim:** to automatically act environmentally or socially without raising awareness or changing user behaviour purely through innovative product design.

**How it works:**

The design solution decreases environmental impacts without changing the user's behaviour.

		User in control				
		Lilley et al., 2005	Rodriguez & Boks, 2005	Elias et al., 2007	Bhamra et al., 2008	Lockton et al., 2010
Informing	Information			Consumer education	Eco-information	Thoughtful
	Feedback	Eco-Feedback		Feedback	Eco-feedback	
	Enabling				Eco-spur	
Persuading	Encouraging	Scripts and Behaviour Steering	Functionality matching	User Centred eco-design	Eco-choice	Shortcuts
	Guiding				Eco-steer	
Determining	Steering	'Intelligent' Products and Systems	Functionality matching		Eco-technical intervention	Pinballs
	Forcing					
	Automatic				Clever design	
		Product in control				

Fig 2.4.5. Dimensions of behavior change according to Daae & Boks

use the bike more.

The last design intervention in this paper was Clever Design; this strategy proposes innovative product design that does not need for the consumer to change their behavior. This has similarities with the example I provided for the strategy Design for Ease of Maintenance and Repair in Chapter 2.3, in which I told about regenerative plastics. For this, see Fig. 2.3.4. It is interesting to consider how much control a consumer should perceive over their product care behavior. In some cases it might be more beneficial to actively nudge or push the consumer to perform product care, while in other cases a mere explanation could suffice and nudging would merely irritate the user.

### Dimensions of behavior change

Daae & Boks (2014) tested in their work 55 dimensions in a design that have an influence on the user's behavior. They categorized these into 9 main sustainable behavior principles from Information to Automatic, see Fig 2.4.5. They researched which dimensions were considered the

most relevant by design professionals for different ways of altering behavior. These relate to the design intervention strategies presented by Bhamra and colleagues. They concluded that it was difficult to prioritize one principle over the other, since it was very dependent on the designers' preference and the product that was to be designed. When developing the design strategies for Product care, it can be interesting to reflect back on these sustainable behavioral design strategies to see how they connect.

Tromp and colleagues (2011) discuss how design can change behavior and potentially lead to sustainable behavior. They take a different angle than Daae&Boks though; they look at how users view the design's influence. Depending on the user, an influence design can have on the experience of a user can range from weak to strong (force) and from implicitly to explicitly (saliency). Based on these two dimensions, force and saliency, the following four types of influence can be distinguished: *Decisive*, *Coercive*,

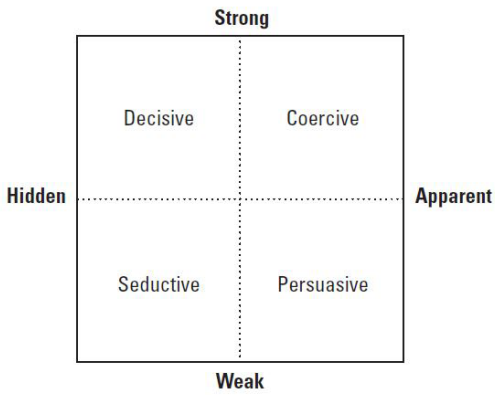


Fig 2.4.6 Four types of influence based on the dimensions of force and salience by Tromp, Hekkert & Verbeek (2011)



Fig 2.4.7. Puzzle switch by Loove Broms and Karin Ehrnberger

*Seductive* and *Persuasive*, see Fig 2.4.6. A product that I would consider *Decisive* is the Puzzle switch, see Fig 2.4.7. This design makes use of human tendencies for symmetry and order. It may not be a very apparent nudge, but the automatic behavioral response we have towards asymmetrical objects is very strong. Tromp and colleagues propose in their paper 11 strategies that are likely used for the four quadrants.

**Key insights**

Fogg’s behavioral model will function as a first way to analyze data during the

empirical research. It can help designers to direct their thinking, although I believe the factors may be too broad and therefore difficult to use during designing itself. The same counts for the other strategies mentioned in this sub-chapter. During the design strategy development I will reflect on existing strategies and see how they link to the strategies found for Product care to be able to validate if these strategies are useful for a Product Care design tool.

These behavioral design strategies show that sustainable behavior can be nudged and promoted in multiple ways. All of the mentioned strategies should be considered valuable. I believe that the link with attachment and emotion is still missing as is the insight in how desired behaviour is or could be experienced by the user. Tromp and colleagues already touch upon these through some of their design strategies, but they are still quite abstract for a designer. When applying the design intervention strategies proposed by Bhamra and colleagues, it seems that sometimes there will still be need for or a trigger, or the heightening of motivation, as mentioned by Fogg.

What needs to be taken into account when reading Daae&Boks’ study is that they concluded that using the dimensions had a negative effect on the amount of product ideas. This does not necessarily mean that these design dimensions, or directions or strategies in general, will have a limiting impact on the idea generation of designers. However, during the development of the toolkit it is wise to keep the amount of output from the tool in mind.



# 2.5 EMOTION-CENTERED DESIGN STRATEGIES

## **Emotional longevity**

Emotion centered design and product attachment theories reach for emotional longevity. Emotional longevity is the creation of a long lasting relationship between the user and the product. Through their emotional attachment to the product users tend to use and maintain it for a longer time than usual. This is highly interesting for the topic of Design for Product care, which is essentially that as well.

One of the strategies that was proposed in the book *Product that Last is Design for Attachment and Trust* (Bakker & den Hollander, 2014): “*the creation of products that are loved, liked and trusted for a longer period of time.*”

It looks at how users develop an emotional bond with their products and how to strengthen the bond that users experience. This strategy is complex and perhaps difficult to obtain since this is not fully controlled by the designer and is user and situation dependent. However, it does cover an interesting part of design which may have a great effect on lifetime extension. If a consumer is attached to their product, they will likely keep and maintain it, no matter if it is fully functioning or not, out of style or shows wear and tear.

In this section I will present determinants and strategies for emotional longevity. During the development of the design strategies for Product care, it will be interesting to reflect on how these developed strategies connect with product attachment theories and to what extent product care behavior can be evoked through emotional attachment.

## **Determinants of emotional attachment**

Mugge and her colleagues (2008) mention the following 4 factors that can promote attachment:

- *pleasure: providing the owner with pleasure*
- *self-expression: expressing the owner’s identity*
- *group affiliation: expressing the owner’s belonging to a group*
- *memories: reminding the owner of the past*

To illustrate the 4 factors, I will introduce a few example, including some of my own belongings.

The Wacom drawing tablet, seen in Fig 2.5.1, is for me a clear example of a product that brings me *pleasure*. I used to draw traditionally, but being able to use a drawing tablet has extended the



Fig 2.5.1. Wacom Bamboo drawing tablet

possibilities for my creativity. A big benefit of this particular tablet over other drawing tablets is that it is travel size, making it easy to carry along and draw wherever and whenever I want.



Fig 2.5.2. Personalized backpack

Backpacks are a nice example for *self-expression* and also for *memories*, see Fig 2.5.2. Many backpackers personalize their backpack, making it able to not only express themselves but also to capture memories. What is often seen on backpacks

are patches from specific locations attached to the backpack, reminding the user of their travels.

For me, a simple product that represents *group affiliation* to me is my *Domoor* mug. It was a present given to all graduating Industrial Design students of the University of Twente during my year. It represents me being part of all these designers originating from Twente and connects me to the other designers that I graduated with. The mug is



Fig 2.5.3. Domoor mug by Richard Hutten

also a well known Dutch design, so it also makes me feel part of the Dutch design community.

All these examples are of products that I, or others, feel emotionally attached to. In my case, this results in being motivated to keep and maintain my belongings if necessary. This product attachment is hard to predict though, since some of these products have gained the emotional attachment due to the specific situation and context or because of their owner. There is a big chance that other people who have the Domoor mug do not have the same attachment to it as I and my fellow students have.

## **Symbolic meaning**

Symbolic meaning is an extension of product attachment. Yang & Galak (2015) explain symbolic meaning as follows: “*Belongings with a symbolic meaning have the ability to resist adaptation and remain relevant throughout the user’s life.*”

Symbolic meaning serves as the starting point of Casais and her colleagues their research (2016). They present a framework of 6 types of happiness related symbolic meaning in products.

- *positive relations with others*
- *personal growth*
- *purpose in life*
- *environmental mastery*
- *autonomy*
- *self-acceptance*



*Fig 2.5.4. Wedding rings hold symbolic meaning because they represent one’s marriage*

They state in their conclusions that the lack of a product responding to the user’s evolving aspirations lead to premature discarding of it. They advise on focusing

on creating higher quality interactions, which could create an extension of the products’ lifetime and a more meaningful relationship between product and user. The core of this research, the user’s evolving aspirations, can be inspirational for Designing for Product Care. A barrier for performing Product care can be the user’s wish for something new or different. If the product were able to create that sense of something new, then the desire for a new gadget might be diminished.

## **Design for savoring**

Another interesting approach is *Design for savoring* (Pohlmeyer, 2014). *Design for savoring* tries to sustain and optimize positive emotions from a positive experience. It does not necessarily focus that much on creating pleasure itself, but more on appreciating experiences. It can be interesting to look at Product care from a different angle, since Product care may be viewed by many as tedious tasks or unpleasant activities. But if it were possible to appreciate the experience, and to prolong positive feelings, Product care can be enjoyed and results savored.



*Fig 2.5.5. Remove your shoes, TU Delft student project by Felix Marschner*



A nice example is a student project of the TU Delft, *Relove your shoes* by Felix Marschner. He developed a toolkit that make users put a lot more attention into the cleaning of their favorite shoes. This was strengthened by the design being a very small brush for your fingers, making the act feel intimate and committed.

### **SLOW design principles**

The Slow Design Principles (Fuad-Luke, 2002; Strauss & Fuad-luke, 2008) try to orientate design practices more towards social, cultural and environmental sustainability. This tool proposes to raise the well-being of people and the planet. It is seen as a step towards sustainable design. These design principles are:

- *reveal*
- *expand*
- *reflect*
- *engage*
- *participate*
- *evolve*

These might be very helpful in creating a long and living form of a design, that evolves with the user.

An example of the principle *evolve*, resides in the municipality I grew up in Friesland, the Netherlands. *Evolve* understands that the maturation of artifacts, systems and environments over time can lead to richer experiences. The *Ecokathedraal* in Mildam, is an ongoing land-art project by Louis Le Roy. The *Ecokathedraal* demonstrates the potential of human effort interacting with the forces of nature. He placed stones and rubble with his bare hands and let nature continue growing around and through it. This experiment started in the seventies,



*Fig 2.5.6. Ecokathedraal in Mildam, the Netherlands*

and has led to the start of a living *cathedral*. The goal is to continue this experiment until the year 3000, this timespan is necessary to be able to study these never-ending and evolving processes of interactions between nature and humans.

### **Key insights**

While the circular design strategies I spoke of focused more on making it easier or more accessible for the user to perform product care, the emotion-centered strategies touch more upon on heightening the motivation of the user for possible product care. These strategies do not incorporate the act of product care, but they do provide the user with an underlying driver to be willing to perform product care. In combination with strategies from circular and sustainable behavioral design they could form a strong combo of providing the user with the ability and motivation for product care behavior.

Fogg proposed that for a behavioral change to take place, ability, motivation and a trigger was necessary. The discussed strategies do not mention any concrete form of triggers. During the empirical research and brainstorm session with designers I will pay more attention to *Triggers*.

# 2.6 EMOTIONALLY DURABLE DESIGN

## **Overlapping circular design and product attachment**

An interesting field to look at is *Emotionally durable design*. Chapman explains in his books (2009, 2015) that it does not focus on the design of durable products, but the design of durable meaning and value that products deliver. It's more about making meaningful interactions or connections and achieving a sustainable relationship between user and product. Emotional durable design essentially is the overlap between sustainable design and product attachment.

Chapman (2015) presents a framework that serves to increase the emotional bond between a person and product. It is a 6 point experiential framework existing of the following points:

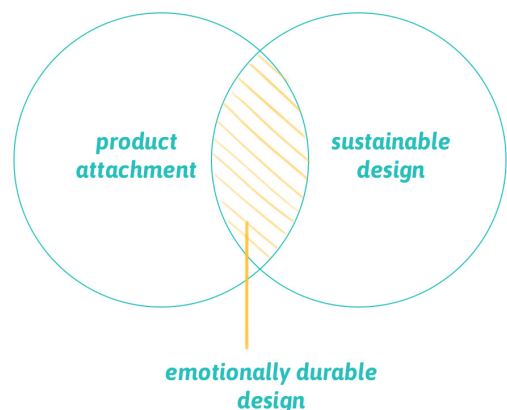
- *narrative*
- *detachment*
- *surface*
- *attachment*
- *fiction*
- *consciousness*.

In a tool composed by Haines-Gadd and colleagues (Haines-Gadd et al., 2018) they show how eco-design strategies and emotion-centered strategies can almost all be connected to this 6 point experiential

framework. This framework is a good summary of the interesting strategies presented in the fields of circular design and emotion-centered design. These 6 points will be reflected upon when developing the design strategies for Product Care.

## **Key insights**

Emotionally durable design aims for product longevity but with the user as its focus. This is a good focus for Designing for Product care because with Product care the user, and especially their behavior, is one of the biggest focus points during designing.



# 2.7 DESIGN EDUCATION

## **The importance of teaching Circular design in education**

It would be very fruitful, according to the Ellen MacArthur Foundation (The Ellen MacArthur Foundation, 2015) if designers amongst others would learn this skill set, of designing sustainably, to realize the shift towards a Circular Economy. I believe that when design students are educated in the standard design cycle, they should also be educated in the circularity of a design. By learning it early designers may automatically incorporate Design for Sustainable behavior, Circularity or Product Care into their design process.

## **Design education related to Circular design and Sustainable design**

Currently, designers receive little education regarding sustainable or Circular Design, let alone Design for Product Care. I myself have followed the bachelor curriculum of Industrial Design Engineering at the University of Twente and a Master's curriculum at the Industrial Design Engineering Faculty, University of Technology Delft.

When looking at the basic educational books, *Productontwerpen* (Eger & Bonnema, 2010) and the *Delft Design Guide* (Van Boeijen, Daalhuizen, Zijlstra, van der Schoor, 2014), of the two universities, they provide little to no information about sustainability or circularity. This does not mean students are not educated in the field of

sustainability, but students have to seek out the courses and sustainability-related education themselves, in the form of a Minor or electives. TU Delft does have one sustainability course in the bachelor called *Design for Sustainability*. This means that designing for sustainable and durable products is not something that designers inherently learn or have experience with.

## **My experience during my design education**

Reflecting back on the way I have been taught the standard design cycle, it becomes apparent to me that designers are not taught to think about the impact of their design on the environment, about the end of life, or about the user maintaining and repairing it. Sustainability was a factor that would be 'attached' to the end of the designing process, by for deciding to use recycled materials.

In Chapter 5 during the development of the design tool I will take into consideration how the design tool can align with the standard design cycle or can be implemented in the future in a design process or in education.

# 2.8 CHAPTER CONCLUSIONS

## **Combining different fields**

As could be read in the past sections, a lot of design strategies exist that can lead to longer and durable product-user relationships. The Circular design strategies touch upon how to support the user in their potential Product care behavior and the Emotion centered strategies on heightening the drive, or motivation, of the user to perform Product care behavior. Knowledge of both is needed. In some design cases, it will turn out that the user's ability needs to be heightened, in other cases the user's motivation and sometimes a combination. What is left, is how the user will be triggered to perform the desired behavior. Based on this research I aim to create a design tool that educates the designer in both fields.

## **A product care design tool**

One of the major challenges that designers will face when designing for Product care is to know the different possibilities. Whether they will let themselves be inspired by product attachment, circular design or sustainable behavior strategies, they need to know which design strategy or directions they can choose. After reading about the extent of the different directions a designer can take it becomes clear that perhaps it is not possible to combine all strategies into

one or a few perfect strategies. I assume that it is more fruitful for designers to learn about the different possible strategies that exist and to have the choice to experiment with one or a few. Daae&Boks concluded that too many strict dimensions may lead to fewer idea solutions. When using the design tool designers should experience freedom for creativity, instead of having to force-fit a design to match a Frankenstein combination of strategies. In Chapter 4 I will look into the design strategies that design students and designers can already imagine and how they are connected with strategies that have been proposed by experts in literature.

## **Design education**

Mainstream design education is limited considering the circular economy and sustainable design strategies that exist. Even after building an inspiring design tool that incorporates all the necessary information, it will not be used if it does not fit how designers work. The risk is that it will be another design tool that designers briefly use at the use of the process, while it should be part of its core. During the development of the design tool, I will research what designers need and how they prefer to use their acquired knowledge.

## **Requirements**

After this Chapter, a few requirements can already be set. These are:

- *A product care design tool has to teach the designer about product care*
- *A product care design tool has to teach the designer about possible design strategies for product care.*
- *The design tool should fit into or match the standard design process.*

# 3

# EMPIRICAL RESEARCH

This chapter elaborates on the explorative techniques used to get an overview of the context of Product care. Methods such as a micro-emotion scan, creative sessions with design students, the clustering of product care activities and photo diaries with end users were used. These resulted in tangible requirements for the product care design tool.



# 3.1 INTRODUCTION

In this chapter the focus lies on the first sub-question:

- *What is product care?*

To be able to design for Product care, I first need to have a better understanding of the context. When the context around Product care becomes clear, it will also become clearer which factors influence it. This will help to understand what designers need, to be able to target and stimulate product care behavior.

To understand the context, I set the following questions:

- *What are the barriers and motivations for the user to perform product care?*
- *What are the important factors that influence product care?*

To get insights into the context of Product care, I researched the context through a variety of explorative techniques. The first was by doing a micro-emotion scan. This consisted of performing a Product care activity myself, to get a first feeling and grasp of possible motivations, barriers and emotions a user may experience.

The second was by asking Industrial Design master students through creative sessions what product solutions they would come up with to stimulate Product care.

The third was by clustering the variety of product care activities to be able to distinguish different types of product care behavior.

The fourth method was handing out diaries to consumers in which they recorded their own product care behavior and their underlying reasons and motivations.



# 3.2 MICRO EMOTION SCAN

## 3.2.1 Goal

To get a feel for the behaviors that are expected of the consumer in this thesis, I performed a product care activity myself and tracked and analyzed my own thoughts and emotions. This gave an idea of the emotions that emerge within the user when confronted with having to (unexpectedly) repair a product. It gave some first insights in the motivations and barriers that I, and perhaps other users, face.

## 3.2.2 Method

The product care activity that was chosen was the replacement of a pedal of a city bike. Without replacing it the bike is still operational, however would be uncomfortable and could still break later on. From the moment that the defect was discovered until a few hours after it was fixed I noted down all micro-emotions I felt at each action, the corresponding thoughts and the strength (positive/negative) of the emotions. These were noted down on post-its when they were happening. This is called a micro emotion scan, they are called 'micro' because their impact on the user's experience and behavior is small and not necessarily lasting. They do point out what is relevant to the user and can help understand how a design can be improved.

## 3.2.3 Key findings

A few examples of moments of the study can be seen on the pictures on the next page. For a schematic overview of the Micro emotion scan, see Fig 3.2.4 on the next pages. For the full analysis, see Appendix 2.

### **A vast range of emotions:**

When looking at Fig 3.2.4, a variety of emotions can be seen. I expected beforehand that the negative emotions would take the upperhand. Looking at the micro-emotions, it becomes apparent that there are already many positive (or neutral) emotions present, which could be interesting to exploit. Such as:

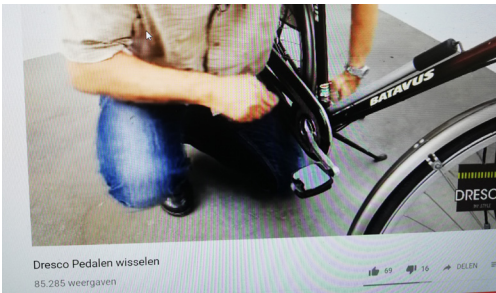
- *Pride (after finishing)*
- *Joy (from being able to do something unexpected)*
- *Optimistic/confident (due to tips from social contacts)*

The negative emotions give an indication which moments to tackle and overcome, such as:

- *Insecurity (not knowing if you have the skills)*
- *Annoyance (the thought of having to put time and effort into the activity)*



*Fig 3.2.1 Discovering the defect pedal*



*Fig 3.2.2 Educating myself on Youtube*



*Fig 3.2.3 Performing instructed tasks*

### **Reflecting on Fogg's factors**

For a complex product such as a bike, ability factors play a big role. In the end it did not lead to strong postponing behavior, since the function of the bike is too important. My motivation was there for very high and based on the fear of not being able to use the bike. With a product that has a less significant role, there could be a chance that product care will easily be

postponed. Its significance pushed me to perform product care even though I had no experience with this type of activity. Very few positive emotions were felt before, during and after the activity.

In this case the trigger was the crooked feeling and sound that the pedal was making. The motivation was already high, however, without this sound and feeling, it would have never even come to mind that the pedal needed replacing. This shows that Fogg's theory was in this case correct when it comes to the necessity of a trigger.

### **Conclusions**

In this case, through high motivation, I was able to heighten my own ability through online research and conversations. With a high enough motivation, people will probably educate themselves. Also, the trigger seemed to have the most crucial role, since this problem existed for weeks, but was never noticed. Once noticed the trigger could not be ignored for long since it was very obvious and continuous. This means that thinking about how your design will trigger product care behavior will be very important.

I believe that it would be good to emphasize the positive moments of product care, trying to achieve and magnify these positive moments.

Overall, it seems that there is an interaction between ability and motivation. For future situations, it is advised that the designer analyzes the user's ability and motivation when designing for a specific product care behavior.

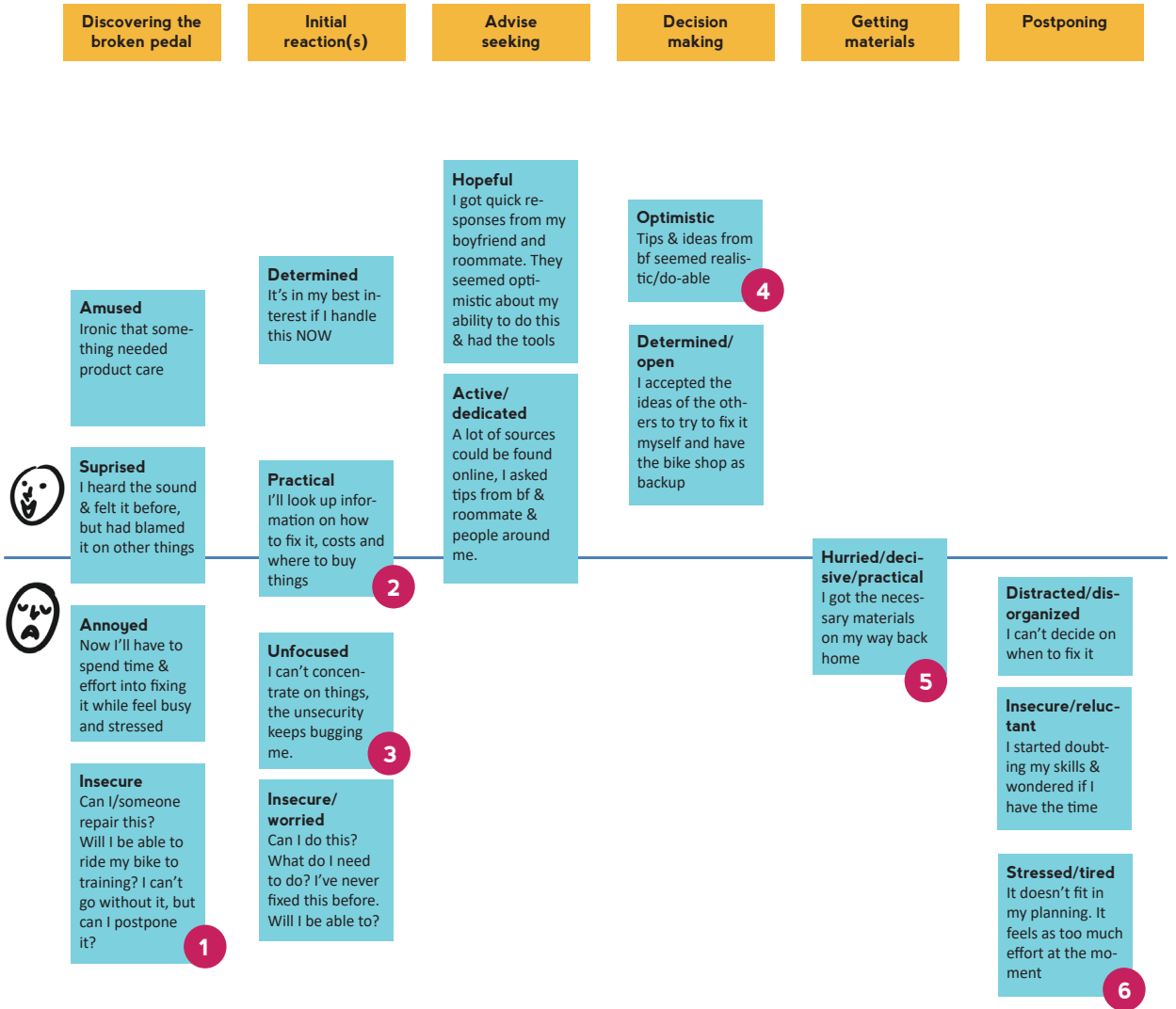


Fig 3.2.4. Micro emotion scan of the replacement of bike pedals

**Preparing workspace**

**Removing broken part**

**Placing new part**

**Finishing up**

**Trying out bike**

**First reactions after**

**Hopeful/joyful/energized**  
It came off without breaking

8

**Proud/joyful**  
The new part fit. Super proud that I did it.

10

**Daring/adventurous**  
I feel like replacing the other pedal as well. Now that I'm busy and I'm able to

**Hopeful/re-served**  
I'm being very careful with placing the new part to see if it fits

**Confident/airy**  
I feel good about myself, I spray some WD40 on it, not even checking Google if that's necessary

11

**Cheerful**  
I'm packing up all my tools happily

**Elevated/confident**  
The bike held up! It feels good riding on it and I feel very glad

**Joyful/extraverted**  
I decide to cycle and get some lunch. I see someone I know along the way and went up to them to chat

13

**Proud/happy**  
I immediatly told my bf afterwards, I felt proud and wanted to tell someone

**Proud/shameful**

Since my bf said I could do it myself I feel obliged to at least try (even though i feel like going to the bikeshop

7

**Exited/nervous/restrained**  
It moved a little, but I'm afraid to get my hopes up

9

**Anticipating/anxious**  
I'm trying to unscrew it but nothing happens

**Anxious**

For a short moment I fear that it might break while trying it out

12

**Insecure**

I don't have a good spot to work, I do it in the public area in front of my building

**Distrusting/Anxious**

I don't expect it to work out. The pedal looked rusty & I see it almost breaking. I'm afraid to break it.

# 3.3 CREATIVE SESSIONS

## DESIGN STUDENTS

### 3.3.1 Goal

For the course of Creative Facilitation at the TU Delft, three students tackled the problem statement that I gave to them:

- *How can you stimulate and trigger users to perform care-taking activities on the ordinary products that they own?*

The goal was to gain inspiration for what might be interesting to focus on during this Graduation project and to see what design students already know about Product care and how they would tackle it without a Product care design tool.

### 3.3.2 Method

Three students held creative sessions with other IDE Master students. They used creative methods to develop small product solutions of how product care can be stimulated and what they thought would be possible strategies for Product Care.

### 3.3.3 Key findings

For the detailed results, see Appendix 3. The concrete strategies created were:

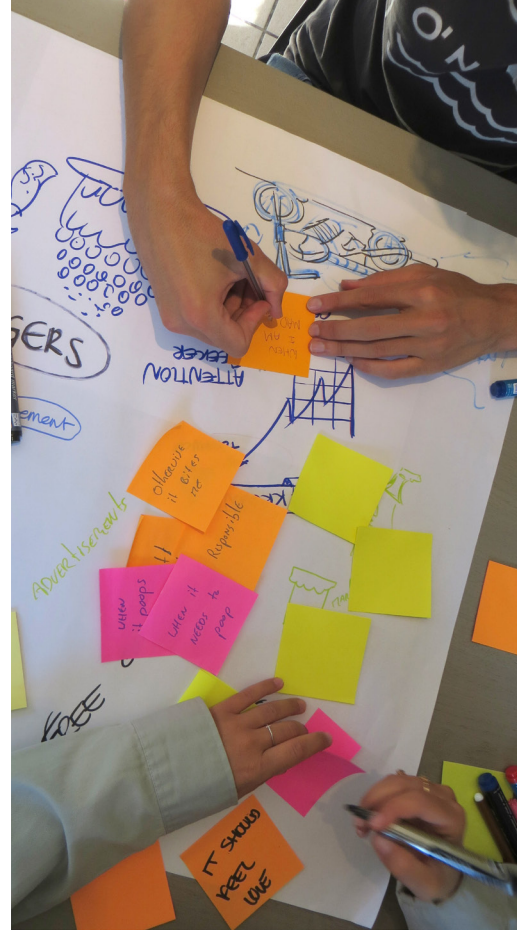
- *personalization*
- *personal connection*
- *added functionality*
- *reward systems*

- *identity (style over trends)*
- Some of the strategies have also been recommended by literature about strategies for product attachment, such as *personalization* and *identity* (Mugge, Schoormans & Schifferstein, 2008).

### Conclusions

The strategies such as personalization could be interpreted as that it is an obvious strategy and not very novel. It could also mean that designers already have a feel for it and therefore it is easy to use as strategy. Some design student already mentioned the significance of an emotional attachment to stimulate Product care. From the lack of concrete examples produced in the session, of how to stimulate the user, it seems that design students still do not have enough insights on how to stimulate Product care or how to apply the strategies they do know. A Product Care design tool could provide them with examples on how to incorporate these strategies into design. One group used a metaphor for explaining Product care, namely: *taking care of your pet*. They discussed the variety of acts pet owners do. This made me realize that it can be very helpful to make a distinction between the different types of product care. The next step is to make groups of different types of product care.





HOW CAN WE MAKE USERS PERFORM CARE-TAKING ACTIVITIES ON THE ORDINARY PRODUCTS THAT THEY OWN ?

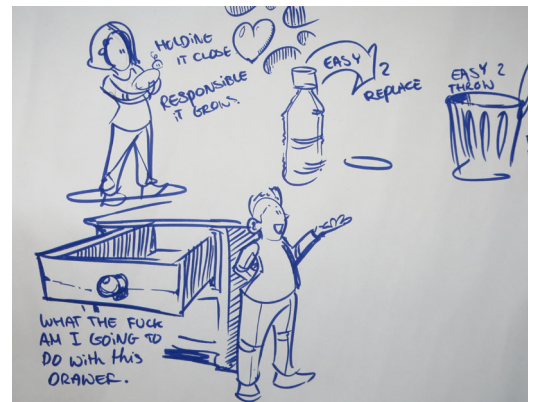
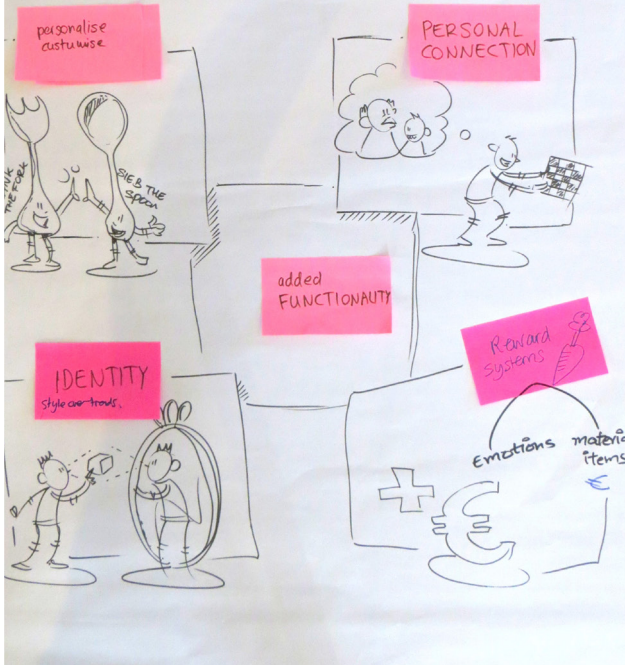


Fig 3.3.1 A few examples of results of the creative sessions

# 3.4 PRODUCT CARE TYPES

## 3.4.1 Goal

During the literature research and the creative sessions of design students it became apparent that there is a variety of different types of product care. A distinction should be made to make the process of designing for Product care more structured. With the design tool in mind, I made the assumption that it would be easier for users and designers to think and talk about Product care if there were different categories within Product care.

differentiate between the different product care acts. And they may support designers in targeting specific behavior, since Product care in its whole, is too broad.

These Product care types will be used in later stadia of empirical research, during the development of the design strategies and for the design tool.

## 3.4.2 Method

To make categories of product care activities a large quantity of product care activities were needed. Data from Laura Ackermann's research and examples from my own experiences were clustered. These can be found in Appendix 4. The activities were analyzed based on the moment/frequency of the activity, the perceived effort and type of action. The product care activities were clustered.

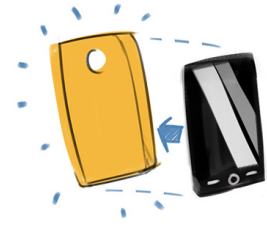
## 3.4.3 Key findings

These clusters became the 7 product care types that can be seen in Fig 3.4.1.

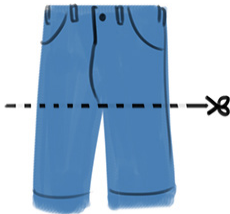
These may support users, in being able to



**1 Repair.** The product or a part of it is broken, preventing it from performing a function or performing poorly. The user performs product care activities that will make the product be able to function again. This can be the repair of existing parts of the product, or the replacement of parts.



**5 Preventive measures.** These are measures taken to make sure a product won't break as quickly. These measures often contain external products that equip or protect the product against its environments.



**2 Creating something new/different.** The user creates a product themselves, let's something be made for them, or they rebuild/remodel/reform an existing product so it feels like a new, different or unique product.



**6 Instructed & mindful handling.** The user knows or feels which behaviors would be bad for the product. This could be by having read a manual, learning about it from others or just by experience. The user tries to prevent deterioration by abstaining from bad behavior/only performing the proper behaviors.



**3 Product revival.** The user tries reviving the product to a certain standard again. This could be to get it functioning better again or to regain a certain look.



**7 Routine acts.** The user performs routine activities unconsciously. These are activities that they have learned to do and have never thought about doing differently or activities that were made into habits.



**4 Small care.** Nothing of the product is broken. Small activities are performed consciously to liven up the product again or to prevent it from deteriorating.

Fig 3.4.1 The 7 product care behaviors



# 3.5 DIARY STUDY

## 3.5.1 Goal

A photo diary study was done with non-designers to answer the following questions:

- What are the most/least performed product care activities?
- What are the most common motivations for product care?
- What are the most common barriers for product care?

The answers give insights into why users fail or succeed to perform care. This might also give insights into how to tackle this.

## 3.5.2 Method

6 participants with ages varying between 25 and 92 were given a booklet to fill in over the course of 10 days, for an example of the photo diary see Fig 3.5.2. They were asked to report the product care activities they performed during that period or had done in the past, and were asked which product care activities they failed to perform. For each care activity, the participants were questioned about why they did it, how they executed it, how often and were asked to provide pictures.

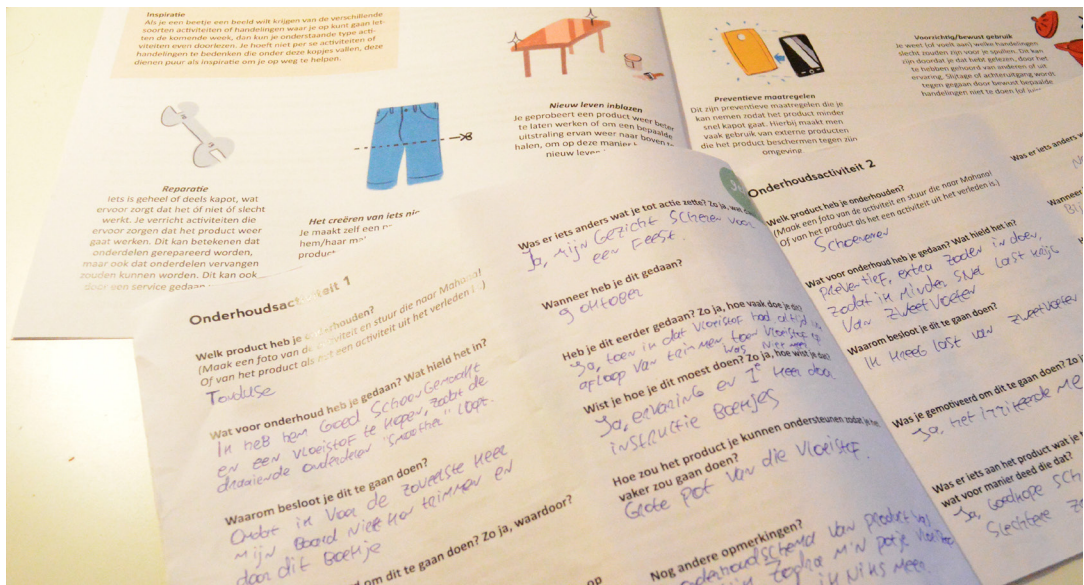
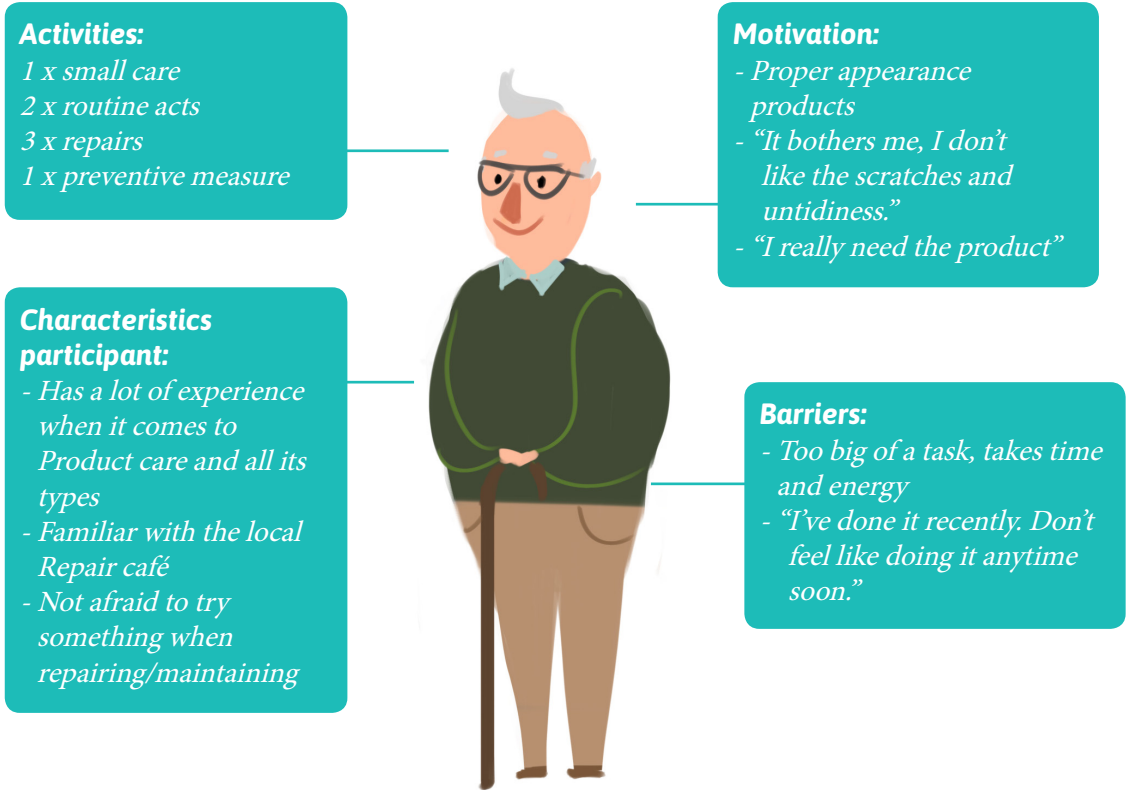


Fig 3.5.1 An example of one of the filled-in diaries



**Participant ‘Frank’ (92 years)**

*Fig 3.5.2 Example participant summary*

### 3.5.3 Key findings

The 6 booklets were analyzed based on the questions stated earlier. They were analyzed per participant. After that, overarching patterns were found, or answers that were unusual. For each participant a visual abstract was made, see Fig 3.5.2. The other participants’ abstracts can be found in Appendix 5. The data of the booklets can be found in Appendix 6 and 7.

#### **The type of activity depends on how the user or designer classifies it**

The most often performed type of activity was *Routine acts*, then *Repair* and after that *Preventive measures*. It seem that activities

that fit into *Routine acts* could also fit in other product care categories and therefore does not give a clear image of the most common type of activities. One participant disconnected the cord of her laptop charger when packing her bag, see Fig 3.5.3. It was defined as *Routine act*, because it was habitual and unconscious. But the activity could also be considered *Mindful Handling* if it were not done unconsciously. The same applies for *Small care* and *Mindful & Instructed handling*, the activities could fit in either type. This shows that activities are not strictly set, but the categorization depends on how the user (or designer) classifies it.



Fig 3.5.3 Disconnecting parts of a charger to avoid damaging the cord in their bag

### **Most common activities are dependent per user**

It differs per participant which type of activities they perform most. For example, the participant of Fig 3.5.3 mostly did low-effort activities, such as cleaning earrings, making sure the adapter of her laptop was rolled up properly and washing her clothes less. While another participant did just as many high-effort activities such as *Repair* and *Product revival*, such as repairing the steer of his motorcycle, replacing wooden planks of a bar and fully cleaning and oiling the parts of a shaver. One thing that was distinctive was that older participants performed more *Routine acts* compared to the two youngest participants who had no *Routine acts*.

### **Least common type of activity**

The only care activity that was hardly mentioned was *Creating something new/different*. Only 2 out of 6 people performed *Creating something new/different* activities, with a total of 3 times.

### **Fear and appearance**

Every participant mentioned something in their motivations related to their fear

for the product breaking down. Every participant performed *Preventive measures* to ensure this fear would not come true or performed other care activities with ‘fear’ as the motivation.

**“I’m afraid it might break someday if I don’t do it.”**

*(about getting her daughter’s bike checked at the bike repair shop)*



Another important motivation for people (which can also be seen as a trigger) is the appearance of the product. 5 out of 6 people mentioned motivations related to upkeeping the appearance of the product, or shame for dirty products.

### **Barriers**

The main reasons given for postponing or failing to perform Product care were the lack of time and the lack of necessity. There were *ór* alternative products *ór* it was not urgent.

### **Triggers**

Participants were often triggered by the physical appearance of products, the loss of a function (or poorly functioning) and

habitual behavior. What sticks out is that many of the products that were failed to be maintained/repared were also products that did have changes in their appearance (looking dirty). People still failed to perform the desired behavior, the trigger was not enough. As a results of procrastination, insecurity about how to do it or the lack of time or interest, people still failed.

### **Emotional value**

What was notable was that (almost) no products were mentioned that were maintained due to their emotional value.

### **Pleasure**

The two youngest participants also saw some of their Product care activities as fun, relaxing or pleasant. Pleasure was derived from the act of working with your hands or the activity being considered fun.

***“I would feel bad about my guests seeing my badly maintained things.”***

*(about her dinner table lamp)*



***“The weather was nice and it was also fun to do.”***

*(about fixing a wooden bar on the balcony)*



### **Conclusions**

There was no clear pattern between participants' Product care behavior. This is in line with the simplicity profile I spoke of in Chapter 2.3. Where a retired citizen scores high on time and money and has difficulty with physical effort and non-routine, a high school student scores bad on the first two, but will not be stopped by physical effort or non-routine behavior. This means that when designing for Product care, for each user you may need to target different motivations or barriers. For a design tool for Product care, defining the user will have an essential role.

Another important thing learned during this study is that even though I defined the different types of Product care, it depends on the user and designers how they interpret the categories and how they would classify the different activities.

# 3.6 CHAPTER CONCLUSIONS

## Research questions

The sub-questions for this thesis are:

- *What is product care?*
- *How can Product care behavior be stimulated through design?*
- *What do designers need to be able to implement Product care into their design?*

It was expected that the empirical research would help with the first sub-question, but in the end it also benefitted the second and third sub-question.

*“What is product care?”*

The definition that was given for Product care in Chapter 1 was: *‘Product care can be understood as any action that helps to prolong the lifetime of a product, such as maintenance or reparation (Ackermann, 2018; Ackermann et al, 2018). These product care activities can be conducted by the consumer itself or by a service, like a garage, or a bike-shop.’*

Product care is not one single type of behavior. Product care is a variety of different types of activities that vary in time and effort. In the degree of skill that is needed, consisting of different actions and is perceived differently by each user. This partially answers the third research question. Since every Product care act for

each product, for each user and for each context is different, a designer for Product care needs to have an understanding of the type of product, user and context he or she will be designing for.

## Provide concrete examples

Through the creative sessions with design students I aimed to already find answers on the second sub-question. They came up with some strategies, a few of which were also found in the literature research. It also became clear that it was difficult for them to come up with concrete examples of how that would be implemented in product design. It will be beneficial to the process if they are provided with examples to get a better understanding of how the translation can be made from a design strategy to a strategy embodied into a design.

## Product care behaviors

Often there was not a clear distinction between the Product care behaviors during the photo diary study. This is because it depends on the product and type of person, as said before.

Even though Product care types sometimes merged together I decided to keep the product care behaviors as they are. They can still provide the designers with

inspiration in different directions and it also can help designers to differentiate between the types of behavior that they can target and which possibilities exist.

Another important insight is, that designers need not think of the user, the product and the product care behavior separately. They need to think about the combination of those three together. Each combination brings different motivations, barriers, interesting opportunities and such.

### **Who's my user?**

One of the most important takeaways for the rest of the process is that the success of performing Product care is strongly connected to the user. Because there is no clear pattern between the users, it means that when designing for Product Care, designers have to analyze their targeted user.

During the tool development phase, I will delve into how to take the user into consideration when designing for Product care.

### **Requirements**

After this Chapter, a few requirements can be set.

- *The design tool should give concrete examples of how it can be applied to design*
- *A product care design tool should present the different types of product care to the designer.*
- *It should incorporate the user and the product, which impact design for Product care*



# 4

# DEVELOPMENT OF DESIGN STRATEGIES

This chapter elaborates on the development of the design strategies. The goal of this phase is to develop product solutions in which product care stimulation is implemented. The three methods used to reach these product solutions are explained. The solutions have been created through individual ideating by myself, by facilitating an ideation workshop with other designers and by looking at existing products that intentionally or unintentionally stimulate product care. These product solutions are clustered into specific design strategies for Product care. At the end of the chapter I will reflect on the strategies found during the Literature review.



# 4.1 INTRODUCTION

In Chapter 2 I presented strategies from the field of Circular design, Emotion-centered design and Behavioral design which is relevant for the topic of designing for Product Care. This chapter focuses on the sub-question:

- *How can product care behavior be stimulated through design?*

Picking the right strategies and translating them from literature into a concrete tool is not a straightforward process. Many of the theories were not empirically based, too theoretical to be used in practice and not easily combined. I have defined which strategies are important by deriving it from practice. In other words, by designing product solutions that stimulate Product care and translating those product solutions into design strategies.

I have done this in three ways:

- *by facilitating an ideation workshop with designers*
- *by designing product solutions myself*
- *by looking at existing products that incorporate product care*

At the end of the chapter the design strategies for Product Care will be presented and discussed and I will reflect on the design strategies that were found in literature.

# 4.2 BRAINSTORMSESSION DESIGNERS

## 4.2.1 Goal

I assumed that designers already have some basic knowledge through their education on how to design for product care. The goal for the brainstorm session was to know what product solutions and which design strategies they would come up with. For this brainstorm the problem statement was:

- *How can a product (or service) stimulate Product care by the user?*

## 4.2.2 Method

A brainstorm session was held with 4 Industrial Design Master students from the tracks Design for Interaction, Strategic Product Design and Integrative Product Design of the University of Technology Delft and 1 UI/UX designer. The session plan can be found in Appendix 8. The participants were sensitized beforehand. They received a short introduction a few days prior to the session about the 7 product care types and were asked to think of 2 examples of products that they manage to repair or maintain and 1 example in which they fail or postpone. The session lasted between 2 and 3 hours, it consisted of purging on the topic Product care, brainstorming abstract solutions for the 7 types and brainstorming on 6 specific products, based on the participants'

examples. These fit into the 6 product categories mentioned by Ackermann (2017).

## 4.2.3 Key insights

At the end of the brainstorm session the group of designers came up with approximately 120 conceptual solutions for product care. At the end of the session they clustered these into design strategies:

- *Showing value*
- *Consequences*
- *Service*
- *Heightening knowledge*
- *Emotions*
- *Product changes*
- *Giving tools*
- *Matchmaking*
- *Enthusiasm*
- *Others are involved*
- *Making it fun*
- *Reminders*
- *Miscellaneous*

The explanations of the clusters and a list of all product solutions can be found in Appendix 9. The product solutions have been used to cluster into design strategies for Product care. The clusters defined during the brainstorm were also taken into account during my own clustering process.



Fig 4.2.1. The setting of the brainstorm session

# 4.3 INDIVIDUAL IDEATION

## SESSION

### 4.3.1 Goal

I assume that the results of the brainstorm with designers was dependent on their knowledge about repair and maintenance activities, existing products and design strategies in general. I have been sensitized by the strategies from the literature research. Therefore it is possible that I can develop different types of product solutions compared to those of the brainstorm session.

The goal for the individual ideation was to develop around 70 product solutions that can be used for the clustering into design strategies. The second goal is to ensure that these product solutions vary as much as possible.

### 4.3.2 Method

Designers are familiar with ideating, so I first let my inspiration roam free. To ensure that the product solutions would vary, I varied between products from all 6 product categories (consumer electronics, means of transport, furniture and interior design, clothes shoes and fashion accessories, sport equipment) mentioned by Ackermann and colleagues (2018) and between the 7 Product care types.

Whenever the ideation process went slow, I made use of a forced fit method.

I made a list with 3 mandatory variables:

- 6 product categories (Ackermann, 2018)
- 7 product care types (see Chapter 3.4)
- 5 sensory senses

And an extra variable when I needed extra inspiration:

- 6 SLOW Design principles (Fuad-Luke, 2002; Strauss & Fuad-luke, 2008)

Through the use of a random generator I would get one of each variable and force myself to develop an idea inspired on the given variables. At first I wanted to incorporate the Fogg drivers but noticed those were too broad to incorporate. I used the SLOW design principles because these relate to emotionally durable design, and would touch upon both physical and emotional durability.

### 4.3.3 Key insights

The ideation led to approximately 70 small product solutions that are expected to stimulate product care behavior. See Appendix 10 for the product solutions. An example of a few product solutions can be seen to the right.

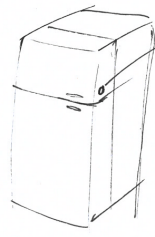


parents/grandparents give their kids a book with self-written tips & advice for when they go live on their own (like a family photo album)

existing template

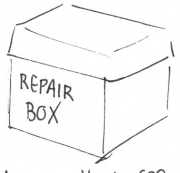
badge reward system, you receive the badge through a service repair service

An online service that 3D prints spare/broken parts. You just scan your product or ~~scan~~ & 3D printer can give you a replacement



sticker that changes colour after being exposed to air for x time. So you know its time for a regular checkup

(like stickers that change when batteries are dead)



A box that can be send to your house which you place broken things in that need fixing. They collect it for you & return it when fixed again



steam of water boiler is turned in ~~the~~ a special colour! Means it needs a ~~diff~~ maintenance/replacing of filter. (like, the smoke of the pipe means different things)



fully personalized clothing, systems where you can adjust/alter almost anything. (making it really fit your identity)

easy peasy! you can do it!

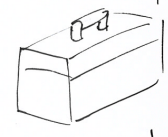
you've done it before!

motivational toolbox

toolbox has motivational messages on it

post apocalyptic game that has a storyline related to the world ending to the world because of people trashing their stuff

toolbox as a family heirloom



toolboxes that can be personalized, also a more 'classic' appearance. Like a wooden jewelry box

benodigde schoonmaak necessary cleaning tools provided with iron skillet. (just 1 set, making them get used to cleaning it with those specific products)

virtual reality simulations of the repair task at hand, making the user less insecure on what to do & seeing it from 1st person perspective



a kit that makes you perform care much closer, smaller/delicate movements. Much more attention & savoring (TU Delft project?)

manual as a comic, making it more accessible & fun to read



it fills up after multiple uses, after it's full, the shower head & such should be decalcified

a thingy for on the wall of your shower

Fig 4.3.1. A few results of my own ideation

# 4.4 EXISTING PRODUCTS AND SERVICES

## 4.4.1 Goal

Many existing product and service ideas/designs stimulate product care. These are useful to use in the clustering process.

Relevant research questions:

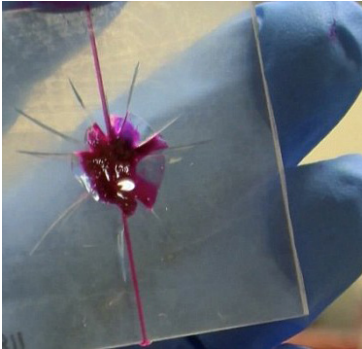
- *What kind of products exist that intendedly or unintendedly evoke product care behavior?*
- *What kind of services exist that intendedly or unintendedly evoke product care behavior?*

## 4.4.2 Method

There was not a set source for information for these products and services. Most of these were found by browsing on the internet, asking other people and looking at products and services that I was familiar with.

## 4.4.3 Key insights

Around 70 existing products/services have been found that intendedly or unintendedly evoke, stimulate or support product care. For the list of product examples, see Appendix 11. In Fig 4.2.1 a few product examples are presented.



*New materials have been developed that can repair themselves*



*Personalizable templates for sneakers make the user part of the creation process and makes the product fit their identity better. They will probably feel more attached to the product*



*The municipality of Rotterdam has placed bicycle pumps and tools next to bicycle paths. This makes the act of Product care much more accessible and flexible*



*IKEA hackers is a website that promotes customizations and alterations of standard IKEA products*



*Repair cafés give people the opportunity to seek help with repairing their belongings and brings people in contact with experts or other people. The social connection between people is an added value of this concept.*



*Some materials, such as white fabrics, figuratively scream that they get dirty quickly. Users are in this way made aware that they should be prepared with a coating beforehand or be used carefully*

*Fig 4.4.1. A few existing product examples that stimulate product care*



# 4.5 CLUSTERING INTO DESIGN STRATEGIES

## 4.5.1 Goal

To find common themes I analyzed the product solutions developed in chapters 4.2, 4.3 and 4.4. Clustering these, based on the type of solutions, made it possible to formulate design strategies for Product care.

Relevant research questions:

- *What are overlapping themes when looking at the product solutions?*
- *What design strategies can be derived from these themes?*
- *How do they overlap with strategies found during in literature?*

## 4.5.2 Method

The product solutions were collected in one place on pieces paper, around 250-270 product solutions in total. I made use of spontaneous clustering, where I randomly pick a product solution and place it next to a similar one, or form a new group, see Fig 4.5.1. This went on until all product solutions were placed somewhere. The clustering process consisted of a few rounds. For one round I asked another IDE student to cluster it with me. A fresh pair of eyes looking at it helped see if I missed any links. By doing it together we had fresh ideas but still with my experience

with product care present. This resulted in better-defined clusters and combined groups.

## 4.5.3 Key insights

Clustering resulted in 8 clusters. These clusters also had multiple sub-clusters. From now on, I will call these the design strategies and sub-design strategies. See Fig. 5.4.2 on page 66 and 67 for a short description per strategy.

### **The developed design strategies:**

- *Experiences*
- *Enabling*
- *Change*
- *Informing*
- *Reflecting*
- *Social*
- *Control*
- *Appropriation*

After the initial clustering phase the sub-design strategies have been altered, in this paper only the final version is presented. For the sub-design strategies see Fig. 5.4.3 on the pages 68 and 69.



*Fig 4.5.1. The clustering process*



### **Experiences**

Think about how you want product care activities to be experienced by the user. Make use of the emotions that can be felt beforehand due to the user's expectations and look into the experiences and emotions experienced during and after Product care activities.



### **Enabling**

Think about how you can make product care behaviour easier for the user to perform, how to provide them with the necessary tools, means or help and thus lower the threshold for them to perform product care behavior.



### **Change**

Think about how the design can create a change or disruption in the day to day routines of the user to bring attention to product care.



### **Informing**

Think about how you can heighten the knowledge of the user, through traditional forms of information, through interactive sources of information and through information hidden in your design.

*Fig 4.5.2. The developed design strategies*



### **Reflecting**

Think about how to make the user reflect on what value a design has to them, through the meaning of the design, or the memories or stories they contain.



### **Social**

Think about making use of the user's social connections. Think about product care leading to social connections or product care as the facilitator of product care.



### **Control**

Think about if your design played the dominant role in the relationship, if it would make decisions itself, steer the user unconsciously or even force the user to perform product care.







### **Appropriation**

Think about creating appropriation possibilities for the user; by providing personalization possibilities, changeable products or by stimulating the user's creativity.



# sub-design strategies

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">experiences</p>				
	<p><b>Anticipating effects</b> making the user associate product care with desired effects or emotions, or postponing product care with negative effects</p>	<p><b>The experience of the activity</b> creating a more pleasurable experience during product care</p>	<p><b>After-effects</b> creating an afterflow feeling after having performed product care, making the experience last or making the effects apparent</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">enabling</p>				
	<p><b>Providing flexibility</b> making the design compatible with standard tools and making them more accessible</p>	<p><b>Providing necessary means</b> providing the necessary means or tools with your product</p>	<p><b>Providing help</b> supporting the user with product care activities or providing the product care to them</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">change</p>				
	<p><b>Motivational triggers</b> pushing users to perform product care or making them want to perform the desired behavior</p>	<p><b>Awareness triggers</b> indicating to the user what type of product care is needed and notifying them when it is needed</p>	<p><b>Product changes</b> changing the product's appearance or behavior to bring attention to product care</p>	<p><b>Change in functionality / performance</b> changing the functionality or performance to indicate product care is needed</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">informing</p>				
	<p><b>Static info</b> using traditional forms of information to heighten the knowledge of the user such as manual or tutorials</p>	<p><b>Interactive info</b> using interactive forms of information, that evolve or adjust themselves to the user, to provide them with the necessary knowledge</p>	<p><b>Physical information</b> explaining what kind of product care is necessary through its physical form/appearance such as affordances</p>	

# sub-design strategies

Fig 4.5.3. Sub-design strategies with examples

reflecting



**Meaningful memories**

making the design hold, represent or stimulate making memories, to make the user feel emotionally connected to the design



**Traces**

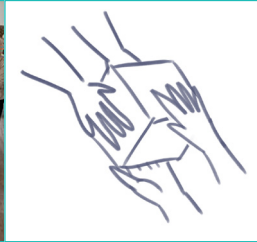
making the design tell a story, showing the beauty in the wear/traces and making them reflect on their interactions with the design

social



**Social connections as a results**

making social interactions part of the product care activities or making it lead to social interactions



**Social connections as a facilitator**

making social interactions support the act of performing product care, or even necessary so succeed

control



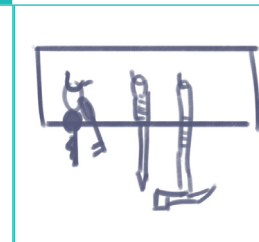
**Product takes initiative**

making the design take the first step of product care and pushing the user to continue



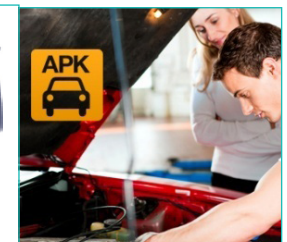
**Product handles product care itself**

making the design update or fix itself, ensuring that the user does not need to perform product care



**Unconscious takeover**

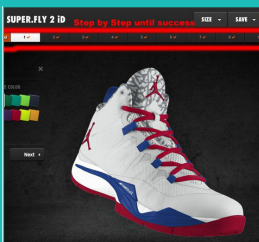
making the act of product care fit into daily habits or routines, making the user unconsciously perform the desired behavior



**Forcing product care**

forcing the user to perform product care, refusing to work if product care is postponed

appropriation



**Personalization**

providing the user with the possibility to alter their product before/after purchase making it fit their identity



**Ever-changeable products**

providing the possibility to alter the design during the user-phase, making it adjust themselves to the changing needs of the user



**Creative change**

triggering the user to tap into their creative side, inspiring and enabling the user to appropriate the design

# 4.6 CHAPTER CONCLUSIONS

## 4.6.1 Reflecting on literature

In the next part I will reflect on the developed strategies, to understand how they connect with existing strategies or if they are novel. On the page 70 and 72 you can see an overview of the connected strategies.

### Experiences

The first sub-strategy *anticipating effects*, which relates to expectations for the consequences, is related to Fogg (2009) and mainly its motivational factors: *pleasure/pain, hope/fear* and *social acceptance/rejection*. This is similar to *Eco-spur* presented by Bhamra and colleagues (2015). *Eco-spur* tries to make the user explore more sustainable behavior by rewarding good behavior and punishing bad behavior. These expectations of rewards and punishment fit the sub-strategy well.

The two other sub-strategies, *the experience of the activity* and *after-effects* relate to theories from Emotion-centered design. Those theories focus on creating a pleasurable experience, such as *Design for savoring* (Pohlmeyer, 2014) and for *pleasure* (Mugge, Schoormans & Schifferstein, 2008). The SLOW design principle *Reveal* looks similar to *the experience of the activity*, since it focuses on revealing everyday experiences that are lost or forgotten. This sub-strategy also sees Product care as something that can be enjoyable, if users were to slow down and experience it.

### Enabling

This cluster can, partially, be explained by the ability factors of Fogg's behavior model. These relate to the simplicity of the desired behavior. Most of the solutions from the strategy *Enabling* relate to accessibility or ease of product care. Enabling has ties to the Circular design strategy *Design for Standardization & Compatibility* and *Design for Ease and Repair* (Bakker & den Hollander, 2014). All sub-strategies of *Enabling* focus on making product care easier or accessible, which match the strategies by Bakker. *Eco-choice* by Bhamra and colleagues (2011) links to this strategy because it focuses on providing the user with options or choices for sustainable use to take place.

### Change

The factor triggers, as mentioned by Fogg (2009) can almost in its entirety explain this group. The strategy *Change* focuses on causing a disruption in the routines and daily life of the user. The solutions all differed greatly in which manner. This was for example by sending reminders, flashing lights, sudden sounds or change in appearance. *Change* can point at direct triggers such as reminders, or signals (notifications), but also a change in the form of the product changing its appearance and/or behavior or a change in the functionality or performance. The behavioral design strategy *Eco-feedback* by Bhamra and colleagues is about informing the user of their behavior by providing tangible aural, visual or tactile reminders.



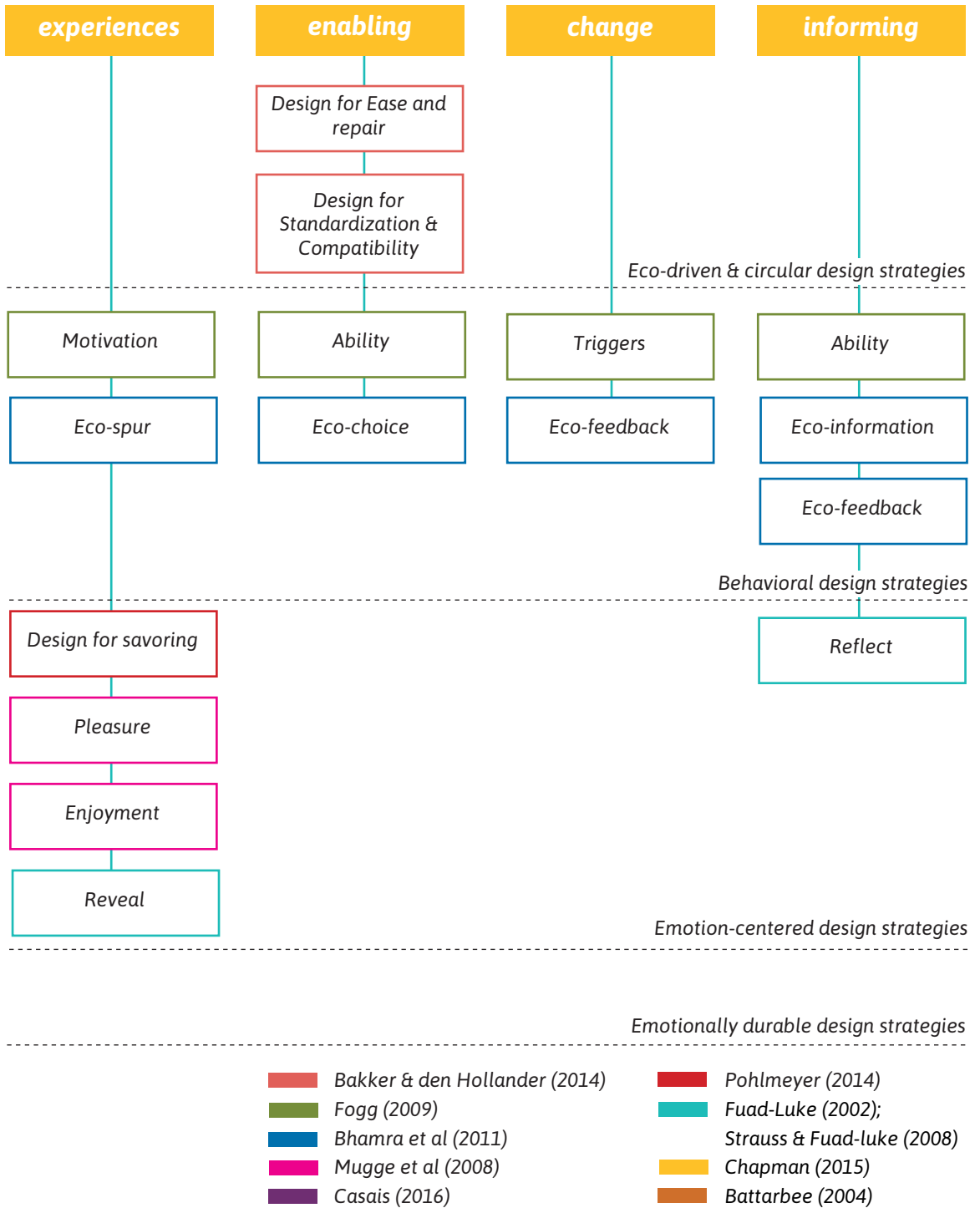


Fig 4.6.1. Connections between strategies and literature

## **Informing**

Informing has ties to the *Ability* factors from Fogg (2009). All three sub-strategies focus on heightening the knowledge, or in other words the ability of the user. It also has ties with *Eco-information* and *Eco-feedback* presented by Bhamra and colleagues (2011). *Eco-information* is mainly focused on making it visible how product, services or systems work, without the push of behavior change, but making the user aware and reflect on their use. As said in the previous paragraph, *Eco-feedback* is about showing the user through signs or reminders what they are doing and facilitate them in how they could make more responsible decisions. The difference between *Eco-information* and *Eco-feedback* is that *Eco-information* merely makes the user aware of how systems works and that *Eco-feedback* also relates it to the use and interaction of the user and shows more directly how they could alter their behavior. The sub-strategy *Physical information* can in some products seem similar to sub-strategies from *Change*, because they both focus on informing the user through the physical form of a product. These type of solutions are also called affordances in design.

## **Reflecting**

Many strategies link to *Reflective*. The sub-cluster *Meaningful memories* relates *Design for Attachment & Trust* (Bakker & den Hollander, 2014) which proposes an emotional connection to the product. It relates to Product attachment theories such as *Aging gracefully*, *Memories* (Mugge, Schoormans & Schifferstein, 2008), *Personal growth* (Casais, Mugge

& Desmet, 2016) and the SLOW design principle *Reflect*. All these strategies make the user reflect on the journey they or their product has gone through. *Attachment* is a strategy mentioned by Chapman's book *Emotionally Durable Design* (2015). For *Attachment* it is relevant that the user has a strong emotional connection to the product, which can also come due to the meaning it conveys which is similar to *Meaningful memories*.

The sub-strategy *Traces* focuses on telling a story through showing the beauty of wear. This also relates to product attachment theories, such as the strategy *Aging gracefully*. It also relates to one of the SLOW design principles *Reflect*. One of the examples of this principle mentions showing the traces of the relation between the product and the user. This strategy also relates a lot to the strategy *Narrative* (Chapman, 2015). Narrative is when users share a unique personal history with the product. This is very much the same as the two sub-clusters which both focus on the history of the relationship between product and user. Traces can also relate to *Eco-information* by Bhamra which proposes to make processes more visible and understandable so it inspires the user to reflect. This theory focuses on reflection in general, not specifically on reflecting on one's own relationship and interactions with a product.

## **Social**

This strategy sees social connections as a result or as a facilitator of Product care. The ties for this strategy were a little less obvious to find. These are not yet mentioned in Circular design strategies

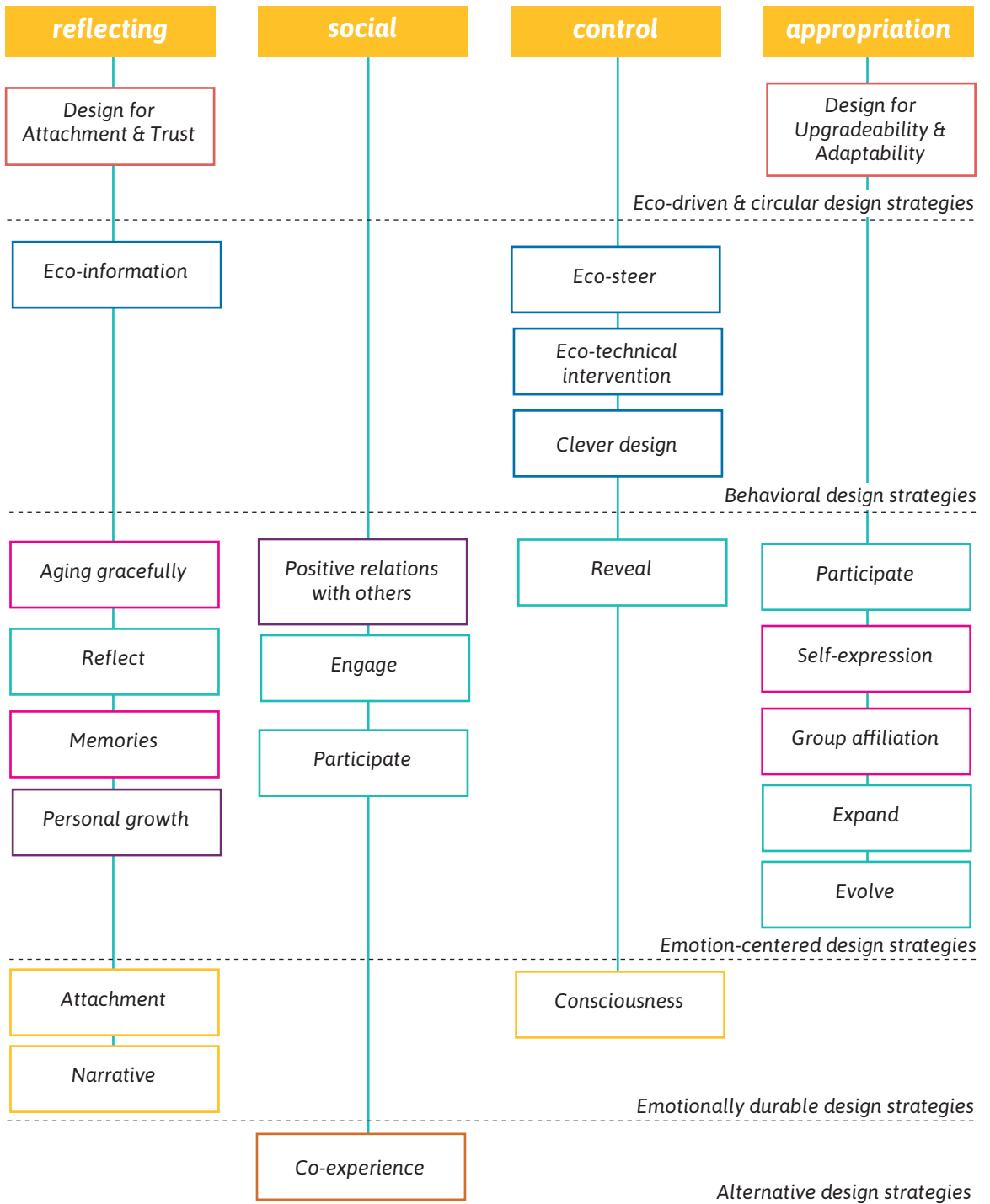


Fig 4.6.2. Connections between strategies and literature

- Bakker & den Hollander (2014)
- Pohlmeier (2014)
- Fogg (2009)
- Fuad-Luke (2002); Strauss & Fuad-luke (2008)
- Bhamra et al (2011)
- Chapman (2015)
- Mugge et al (2008)
- Casais (2016)
- Battarbee (2004)

and the link with Behavioral design strategies were also scarce. It did link to a few Emotion-centered design strategies. The SLOW design principles *Engage* and *Participate* seem the closest link to Social. *Engage* proposes that processes should be more collaborative and rely on sharing. This could have ties with the sub-strategy *Social connections as a facilitator*. They both propose that processes should make use of shared human knowledge or effort. *Participate* is described as follows by Strauss & Fuad-Luke (2008): “*Slow Design encourages users to become active participants in the design process, embracing ideas of conviviality and exchange to foster social accountability and enhance communities.*” The last part of this statement is interesting. This seems similar to the sub-strategy *Social connections as a result of product care*. Processes, services or products that result in new or deeper social connections. The last product attachment strategy which also relates to this sub-strategy is *positive relations with others*, by Casais and colleagues (2016).

A strategy that was not discussed but could also explain why *Social* is strategy for Product care is the strategy *Co-experience with others* by Battarbee (2014). *Co-experience* is a blend of user experience of products and of social interaction. It also relates to creativity and collaboration and how this can positively impact someone’s or the collective’s experience. This principle may explain how social connections can positively influence the user’s willingness and ability for Product care.

## **Control**

*Control* has many ties with strategies from Bhamra and colleagues (2011), such as: *Eco-steer*, *Eco-technical intervention* and *Clever design*. They vary in the degree in which the product or service has control in the user-product relationship. For example, the sub-strategy *Forcing product care* is almost the same as *Eco-technical intervention*: they both propose to force a behavior change upon the user. *Product handles product care itself* can be compared to *Clever design*, where the user does not even have to think about the act of product care. This strategy also relates to the strategy *Consciousness* from Emotionally Durable Design (Chapman, 2015): “*the product is perceived as autonomous and in possession of its own free will; it is quirky and often temperamental, and interaction is an acquired skill that can be fully acquired only with practice.*”

## **Appropriation**

The sub-strategy *Personalization* relates to strategies proposed by Mugge and colleagues (2008), such as *self-expression* and *group affiliation*. These strategies all relate to the expression of one’s identity in the product. The sub-strategy *Ever-changeable products* has ties with the Circular strategy *Design for Adaptability and Upgradeability* (Bakker & den Hollander, 2014). They both relate to products that can change and be upgraded when the user desires so.

These two sub-strategies also relate to SLOW design principles. For example the principle *Participate*, which was explained

in earlier.

And the principle *Evolve*: “*Slow Design recognizes that richer experiences can emerge from the dynamic maturation of artifacts, environments and systems over time. Looking beyond the needs and circumstances of the present day, slow designs are (behavioural) change agents.*”

And also the principle *Expand*: “*Slow design considers the real and potential “expressions” of artifacts and environments beyond their perceived functionalities, physical attributes and lifespans.*” (Strauss & Fuad-luke, 2008)

These principles all discuss how the user should be involved in the making of a process or product and how their relationship can evolve and grow over time.

The only sub-strategy that does not have any clear ties to existing strategies is *Creative change*. This strategy has some weak connections to the previously mentioned strategies for *Appropriation*, but there is no clearly defined strategy that proposes the same thing: to inspire the user to appropriate their belongings.

## 4.6.2 Conclusion

All strategies can be linked back to strategies or principles that were found during the literature research of this thesis. The only sub-strategy where no existing literature could be linked to was *Appropriation*, *Creative change*.

During this Chapter the focus lay on the sub-question:

*“How can Product care behavior be*

*stimulated through design?”*

The answer to this question, for now, is through using the strategies proposed in this chapter:

- *Experiences*
- *Enabling*
- *Change*
- *Informing*
- *Reflecting*
- *Social*
- *Control*
- *Appropriation*

The final version of the strategies however needs to come in a format which allows the designer to learn about the various design directions and that makes them understand how they can use the acquired knowledge.

The advantage of these strategies over the strategies found in literature is that these strategies combine knowledge and insights from different fields, but are conveyed in a compact way. Because they are based on existing/conceptual product solutions, designers can also get more insight into which strategies can be successful for a specific type of product care or how a certain strategy can be embodied in a design.

Some design strategies from literature already provide examples of how a strategy is made use of. The strategies that I developed are all based on real (or conceptual) solutions. These examples can help designers greatly, who (almost always) require inspiration. The design tool for Product care can provide these examples and thus give a more complete and comprehensive understanding of the design strategies that exist.

# 5

# DEVELOPMENT OF DESIGN TOOL

This chapter elaborates on the development of the design tool. The goal of this phase is to develop a product care design tool that can be tested and further iterated. Two versions of the design tool will be presented, the first is a walkthrough template, the second is a further developed iteration of the template, which is the brainstorm card set. After the testing of the second version, recommendations for the final design of the design tool will be presented.



# 5.1 INTRODUCTION

In the previous chapter I presented and discussed the design strategies that lie at the core of the Product care design tool. In this chapter I will explain the process of the development of the design tool, which can be considered the embodiment of the design strategies.

The last sub-question which will be answered in this chapter is:

- *What do designers need to be able to implement product care into their design?*

This is done through a iterative ideation process and testing with designers and design students.

The steps taken during the development of the design tool consist of:

- *looking into existing design tools and methods*
- *finalizing requirements for the design tool*
- *developing paper prototypes*
- *testing the different design tool iterations*

At the end of the chapter recommendations for the final version of the design tool will be presented. Here I will also reflect on the research question.



# 5.2 PROCESS

## 5.2.1 Method

In this chapter the development of the design tool for product care is presented. In this process 2 mayor iterations have been developed, with smaller in-between iterations. These iterations are tested with Bachelor and Master students from the Industrial Design Engineering Faculty of the University of Technology Delft, from the University of Twente and with UI/UX designers.

During the tests the following research questions were set which relate to the use:

- *When in the designing process is a product care design tool useful?*
- *Which knowledge or information is essential for a designer when designing for product care?*
- *What is the process like, that a designer goes through with the design tool?*
- *How would designers prefer to use such a design tool?*

And research questions related to the overall goal of the tool:

- *How can a design tool teach designers about Product care and the different types of product care?*
- *How can a design tool teach designers about the possible design strategies for Product care?*

- *How can a design tool inspire designers?*
- *How can a design tool teach designers how to implement this knowledge to their design?*

Through observing how participants use the design tool iterations and by interviewing them afterwards I was able to get insights in what a Product care design tool should offer. In this chapter the two main iterations are presented, with the main elements of that tool and the insights from testing that iteration. The in-between iterations will not be presented in this paper. The two iterations that will be presented are the two biggest steps, the in-between iterations are variations leading up to those two iterations.

## 5.2.2 Existing tools and methods

To gain insights in which format would work for a Product care design tool, I looked into existing design tools and methods. The tools and methods were not limited to tools meant for designers, but were also exercises or methods used for other fields. Most of the tools that were used as inspiration were looked at superficially.

During the process of developing a design tool, I found inspiration by asking myself the following questions and by the way existing methods or tools tackled this.

- *How can the concept of Product care and its different facets be explained?*
- *How to communicate which design strategies exist and how to apply them?*
- *Which format would best suit a tool for product care?*

### **Explaining Product Care**

The global concept of Product Care is quickly explained. “*Product care can be understood as any action that helps to prolong the lifetime of a product, such as maintenance or reparation.*” (Ackermann, 2018; Ackermann, Mugge & Schoormans, 2018) Understanding how to design for it is difficult though. Chapter 3 showed that there are many types of Product care. To figure out how the tool can best help and support designers into understanding how to design for product care I looked into familiar methods and tools and into the standard design cycle that design students are taught at the University of Twente, through the book *Productontwerpen*, (Eger & Bonnema, 2010) and at the TU Delft, through the *Delft Design Guide* (Van Boeijen, Daalhuizen, Zijlstra & van der Schoor, 2014). Industrial Design students in the Netherlands are taught the standard design cycle. According to Eger and colleagues, the standard design cycle exist of the following phases: *Analysis, Ideation, Conceptualization, Detailing and Evaluation*. This designing process is being taught through practice. Practicing the use of the design cycle in design projects allows design students

to grasp this elementary process so they can incorporate it in their daily design projects by heart. Like riding a bicycle, the knowledge about how it is done is tacit. People become unconsciously competent and do not think about how it works any longer.

The same should count for learning about Product care. If this tool has to make an impact, the best way is to implement it in at the beginning of designer’s education and practicing it often through projects. This way, future designers will unconsciously master it and be able to implement it in their designing process.

This tool should not just be applied somewhere at the end of the design process where one follows a tool’s steps and reaches a redesign. By practicing, a designer is able to first understand Product care and later apply it into his/her project.

This means that the main purpose for the design tool will be to teach designers about Product care so they will understand it, and will find useful and sensible to implement in their standard design process, even though their main focus may not necessarily be to Design for Product care.

### **Communicating the design strategies**

Because the main purpose for the tool is to supply designers with knowledge, an important question is: *How to teach designers which design strategies are possible for Product care and how can they be applied to a design.*

For this, I looked into other design tools that aim to communicate design strategies. An example is the SIM toolkit by Mafalda Casais, see Fig 5.2.2.1. The SIM toolkit aims to inspire designers to create design

that makes use of symbolic meaning and supports subjective wellbeing. The interesting thing about this design tool is that the tool consists of 6 dimensions that are each presented briefly on the cards. For each dimension, a few design directions are advised. What makes them more tangible and easier to understand is that for each design direction one or a few questions are asked, to make the user think deeper about the subject. Why this is interesting for a Product care design tool is that the design strategies are still very abstract. By asking the designer questions and directions to think in, it may be easier to understand what the core message of each strategy is. What I miss in using the SIM-card set is the connection with actual design. It is hard to imagine the effect on designs due to the usage of the cardset. For a Product care design tool I aim for tangible examples of how the strategies can be implemented.

**Format**

Most designers are used to apply many different tools and methods in different formats. I aim to make a tool that can be implemented in current designing processes, therefore it should not be intrusive and be adaptable to current ways of working.

Methods and tools exist in many formats. Tools and methods which format have been an inspiration for this tool are:

- *creative sessions*
- *personas*
- *board of innovation card set*
- *triggers cards*

I have seen the potential of creative session, through the course Creative Facilitation at the Technical University of Delft.



Fig 5.2.2.1 SIM card set by Mafalda Casais



Fig 5.2.2.2 Clustering exercise during the creative session of Chapter 4

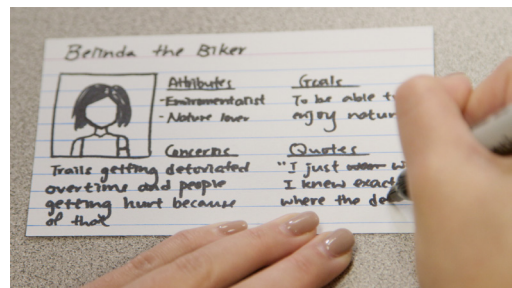


Fig 5.2.2.3 Example of a short user persona

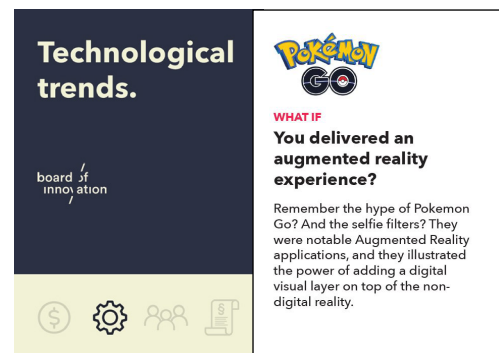


Fig 5.2.2.4 Board of innovation card

Through a group's interactions, discussions and hitch-hiking on each other's ideas an ideation session can really speed up and improve. This is interesting for a Product care design tool, because with this tool I aim to move away from the mainstream solutions of informing users of necessary product care through a manual, but strive for novel and innovative ideas as well. The field of creative facilitation offers many exercises, see Fig. 5.2.2.2, and insights that can be beneficial for this tool.

The making of personas, see Fig. 5.2.2.3, is a well known technique which can help a designer create empathy for the user they are designing for. These can be in-depth, based on behavioral patterns and user research. For this tool it can already be sufficient to have a superficial idea of the user and which motivations and barriers you may face. Two card sets that also provided inspiration for this tool are the *board of innovation card set* (*Board of innovation card set, n.d.*) and the *triggers card set* (*Triggers*



Fig 5.2.2.5 Triggers card set

*card set, n.d.*), see Fig. 5.2.2.4 and Fig 5.2.2.5. These are both card set meant for brainstorming. The card sets ask the user 'what if' questions and in the case of board of innovation also relate it to an existing service or company.

This is similar to the HKJ (Hoe Kun Je) technique which is taught to design students at the TU Delft, where you asks yourself: 'How can I...?' Such formulation of questions tend to work inspiring and can help people in their way of thinking.

## Requirements

The following requirements have been drawn from the research into existing design tools:

- *It should fit into the standard design process*
- *The process of using the tool should provide a sense of structure to the designer*
- *It should provide inspiration for design solution(s) that take product care into account*
- *It should incorporate the the user and the product, which impact design for Product care*
- *The strategies should be explained in such a way that the user understands them without having to read/search extra information*
- *It should be clear to the user of the tool what the main message of each strategy is and have an idea of how that can be translated into a design*



# 5.3 ITERATION

## WALKTHROUGH TEMPLATE

### 5.3.1 Elements

#### Format

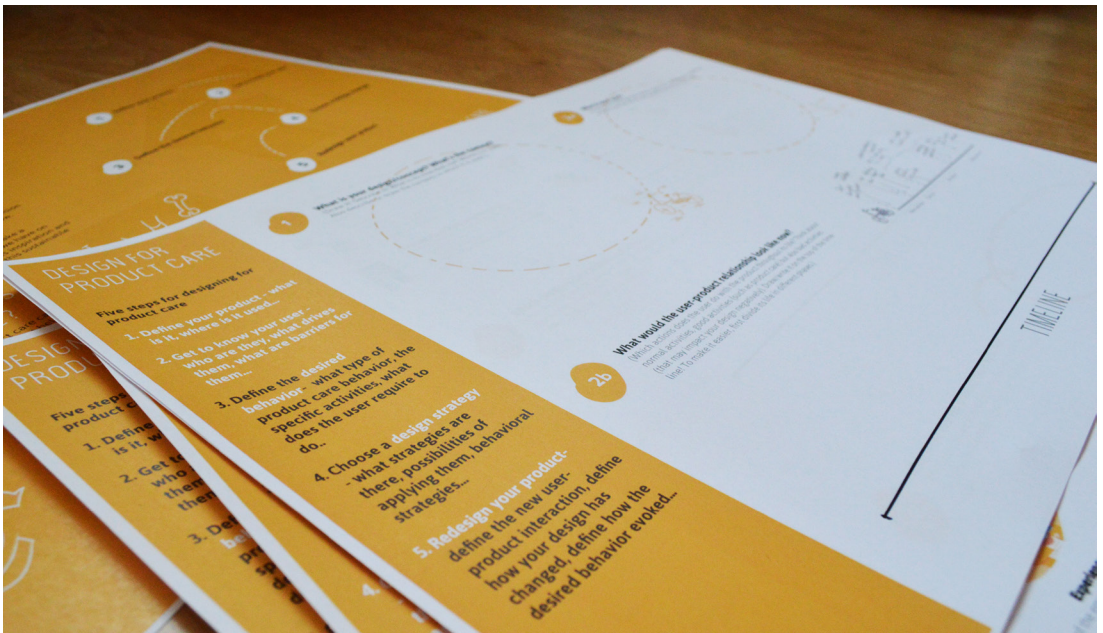
The first iteration is a template that can be printed and filled in, the detailed pages of the concept can be found in Appendix 12.

It consists of 1 A3 information sheet regarding Circular Economy, Product Care and the purpose of the tool. 4 A3 worksheets complete the template. These should be filled in by the designer and will lead to a conceptual design in the end. The template set comes with a two sets of cards. The first set explains the design- and

sub-design strategies and a set of smaller cards shows product solutions for each sub-design strategy. An example of the sheets and these cards can be seen on pages 82 and 84.

#### Process

In the figure on page 83 you can see the process/steps of this tool. The process is linear, with each step creating a solid base to fulfill the next one successfully. This iteration focuses mainly on the content. To see if the process is understandable and logical. The focus is less on the format.



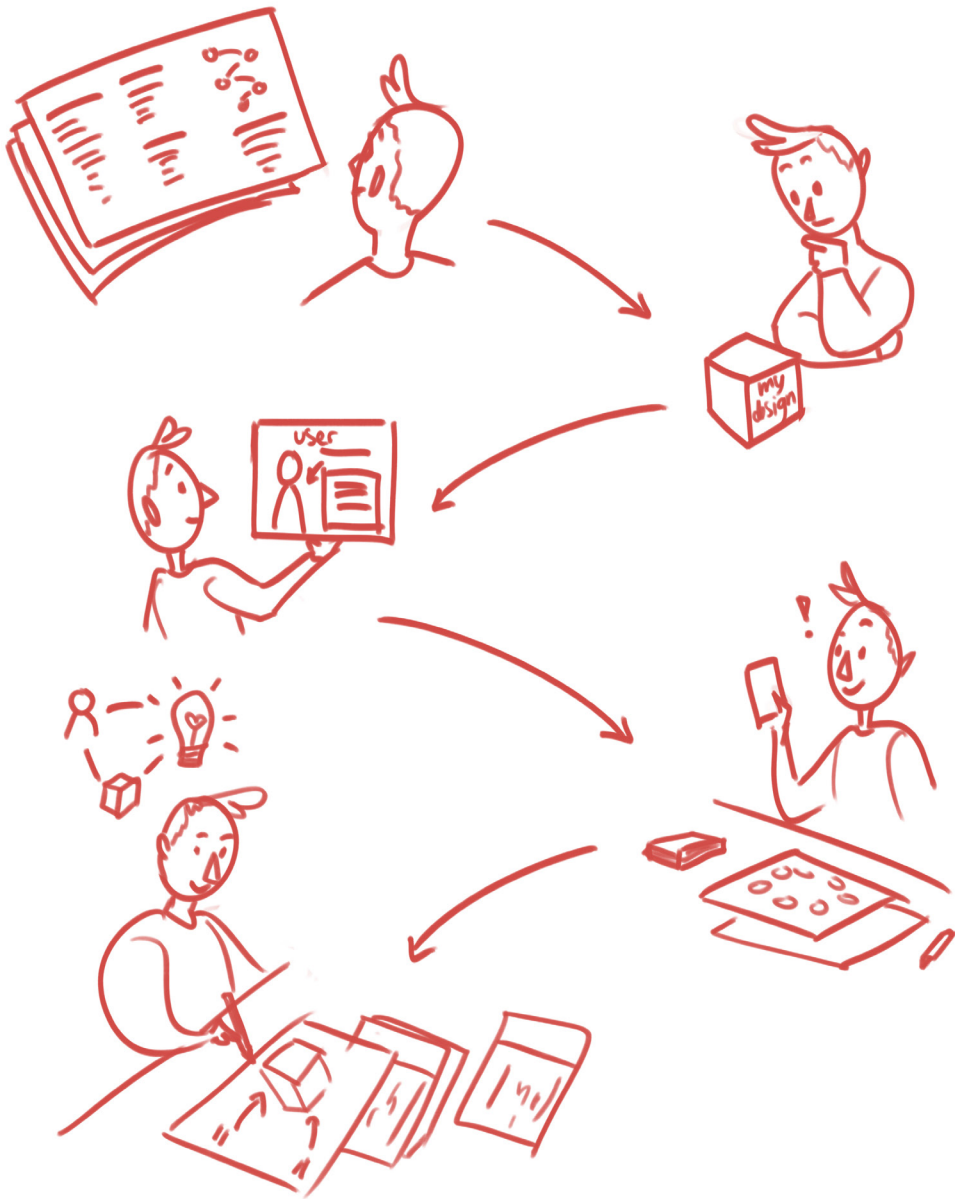


Fig 5.3.1 Process of the walkthrough template

**The steps of the template:**

- *Receiving an introduction about Product care through reading the info page*
- *Defining the product*
- *Defining the user*
- *Defining the desired product care behavior*
- *Choosing a design strategy*
- *Reading example product solutions*
- *Developing a product solution*





Fig 5.3.2 Examples of the worksheet in use and the design strategy and example cards





## 5.3.2 Testing

### Participants

4 individual participants:

- an Industrial Design Engineering bachelor student
- a DFI master student from University of Technology Delft
- an IDE master student from University of Twente
- an UX/UI designer

### Method

The participants were questioned individually. A set of prepared questions were asked during open conversation about the tool. The participants were asked to analyze and try out the tool. After analyzing each page they were asked for their thoughts and questions relating to the comprehensibility of the tool, the process, the information given in the tool and how inspiring it was.

## 5.3.3 Discussion

The results were documented and recorded and analyzed.

*“ I would do step 3 till 4b more at the same time, this is more of ‘going back and front in between steps’ for me, a creative process where all information influences each other.”*  
~ a participant

### Linear or open process

One important remark given to the tool was that even though it was meant for ideation and brainstorming, which are

very open and often chaotic processes, the process of the tool was linear and participants therefor felt that they did not have much freedom to adapt to their way of working and their usual design process. The participants found that an expected downside was that it might lead to a less inspiring process, because they felt restricted.

### Linking product care and design strategies

All participants wanted to know if there was a link between the Product care types and the Design strategies. The participants thought it would give some guidance on which combinations could be useful.

### Introduction text

Participants found the introduction that was given on the first page was understandable but too extensive. The participants suggested that this type of information could be given through an explanation from someone else. This suggestion might be considered providing that the expected setting, in which a product care design tool will be used, is probably a workshop or lecture. information that is provided with the design tool could take that into consideration.

### Overwhelming amount of questions

One participant said the questions asked were overwhelming. The amount of questions asked and the difficulty of them were demotivating. More participants had multiple questions during this part of the design tool. It seems that the questions in general should be rethought, to determine

**“Perhaps ask less questions in one go, perhaps first ‘draw your user’ and then ask a few questions.”**  
~ a participant

which questions are essential or which questions should be formulated differently.

### **Conclusions**

After these test I focused on the following things with the next iteration:

- *Making the process more flexible*
- *Trying to find a connection between product care types and design strategies*
- *Making the introduction easier and more pleasant to read*
- *Focusing on the essential questions and how they should be presented*

Those focus points are very concrete.

Another important change was the overall purpose of the tool. At the beginning of this Graduation thesis the purpose of the tool was to enable a designer to develop a redesigned product or several concrete redesign directions. After the discussion with the participants and reflecting on the design tools and methods, I concluded that designers are actually able to design for complicated matters because they have learned the process by practicing, by doing it over and over and by informing

### **Requirements**

After this Chapter, a few requirements can already be set. These are:

- *The design tool’s process should be flexible for the designer to alter to their liking.*
- *It should be useable for an individual and small groups of designers.*

themselves. I realized I cannot expect that with a single tool, a designer is able to successfully redesign a product. Product care is a complex matter where multiple factors influence each other; the user, the type of product, the context and the type of product care. I decided to readjust the requirements for the tool.

The main takeaway was, that to make designers able to design for Product care I would first have to teach them about it and about the different design strategies. Once they have learned about it and have practiced it a few times, they will be able to apply it to their own design projects. The test showed that the content and the process was good, but the format has to change to make it more flexible for the designer to alter it to their liking, and to grant them the freedom to use methods that have their preference.

Because the planned setting for the design tool would be a learning environment or a workshop, the format should also be made available to use with a few people at the same time, since most workshops and projects are team-based. This is also beneficiary for the outcome of the design tool because working with multiple people often leads to more discussion and thus different insights and more inspiration.

# 5.4 REQUIREMENTS

During the whole research I collected requirements by looking at current design tools, methods, field research and testing. These requirements were finalized after the testing of the walkthrough template.

## **Purpose:**

- *Teaching designers about product care*
- *Teaching designers about design strategies for Product care*
- *Give concrete examples of how it can be applied to design*

## **Information:**

- *It should present the 7 types of Product care to the user*
- *It should present the 8 strategies that can be used for designing for product care*
- *It should incorporate the user and the product, which impact design for Product care*

## **Strategies:**

- *It should be clear to the user of the tool what the main message of each strategy*

*is and have an idea of how that can be translated into a design*

## **Process:**

- *The process of using the tool should provide a sense of structure to the designer*
- *The design tool's process should be flexible for the designer to alter to their liking.*
- *It should fit into the standard design process*

## **Tool in general:**

- *It should provide inspiration for design solution(s) that take Product care into account*
- *It should be useable for an individual and small groups of designers*

# 5.5 ITERATION BRAINSTORM CARD SET

## 5.5.1 Elements

### Format

In Chapter 5.3 the first iteration was presented. The second iteration is a card set that supports the designer in mapping all important factors that influence Product care. For the cards, see Appendix 13.

It consists of:

- 7 Product care cards - These cards describe the different types of Product care activities.
- 8 Design strategy cards - These describe the different design directions a designer can think in.
- 8 Persona cards - These can be used as

*inspiration for designing for a specific user.*

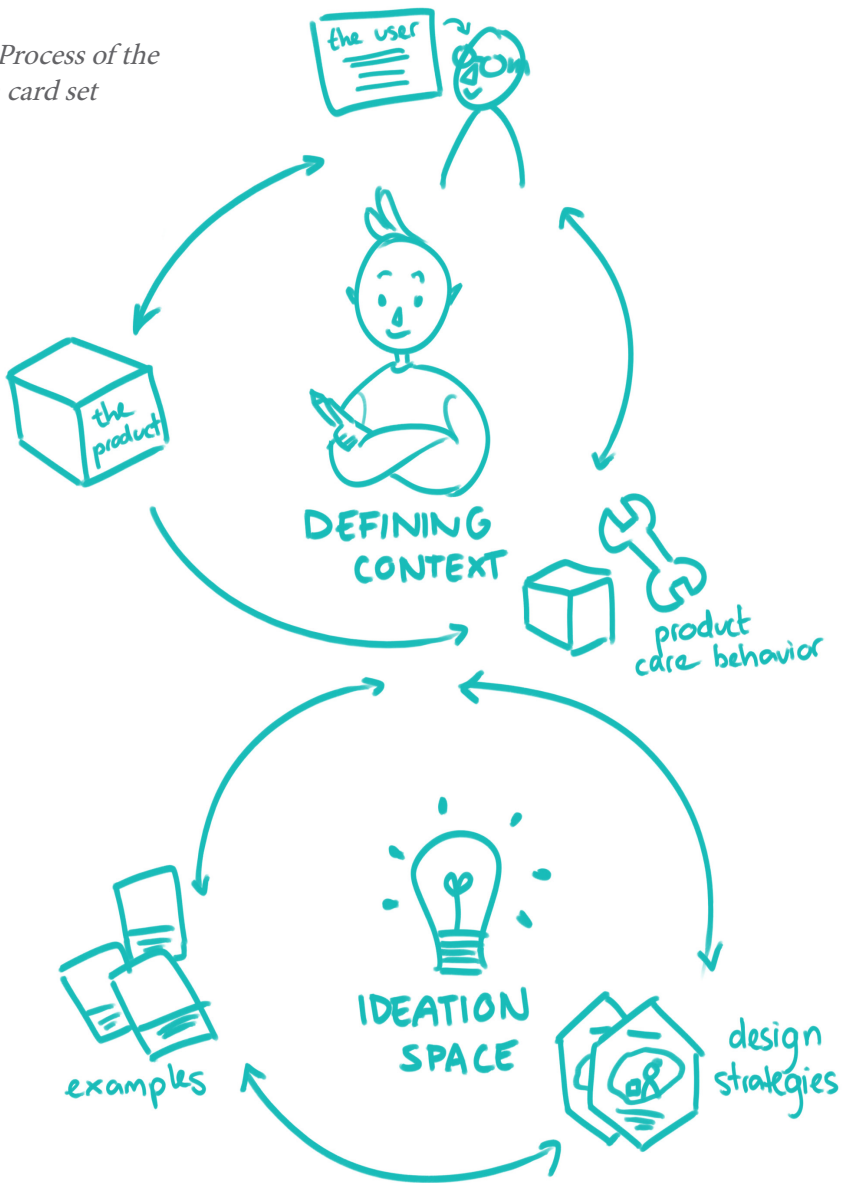
- 6 Product cards - These can be used as *inspiration for designing for a specific product.*
- Around 50 example cards - These are *examples for the sub-design strategies to derive inspiration from.*

### Process

When testing the walkthrough template it became clear that it really depends per designer (and their expertise) what kind of process and focus they prefer. After the previous test it was decided that the main purpose for this tool is to teach them about Product care, about the design strategies



Fig 5.5.1.1 Process of the brainstorm card set



and about all factors that influence the context of Product Care. When the tool succeeds at this, the designer will also be able to apply it on other projects. This resulted in a card set that can be used in a brainstorm or creative session situation. The process is flexible and can be altered depending on the designer's preference. It is also no longer a template, but consist of inspirational cards to brainstorm with or to evoke discussion and reflection.

**The steps of the tool:**

- *Receiving an introduction about Product care and reading the info page.*
- *Reading an example of the process*
- *Brainstorming on a product*
- *Brainstorming on a user persona*
- *Brainstorming on multiple product care types*
- *Brainstorming on multiple design strategies*
- *Getting example solutions from the*







*different design strategies*

- *Alternate between design strategies/ Product care behaviors/user personas*
- *Ideating product solutions*

The process described here is an example process. This process is advised to follow during the first time use of the tool. It is not mandatory and it is encouraged to use the tool any way the designer prefers.

A big change is the way these cards are used. They are no static sheets which can

be used only one time. These cards can lead to a variety of combinations, making the process more flexible and open to the designer.

Another big change is that the cards can be used in multiple ways, as a discussion tool or to brainstorm with. When brainstorming/ideating with the cards designers can draw around the cards on a whiteboard, because the cards are magnetic.

It is also possible to use them on paper.



Fig 5.5.1.2 The different elements of the card set

## 5.5.2 Testing

### Participants

3 groups of 2 participants:

- 1 DFI student and 1 UX/UI designer
- 2 IPD students
- 1 IPD student and 1 UX/UI designer

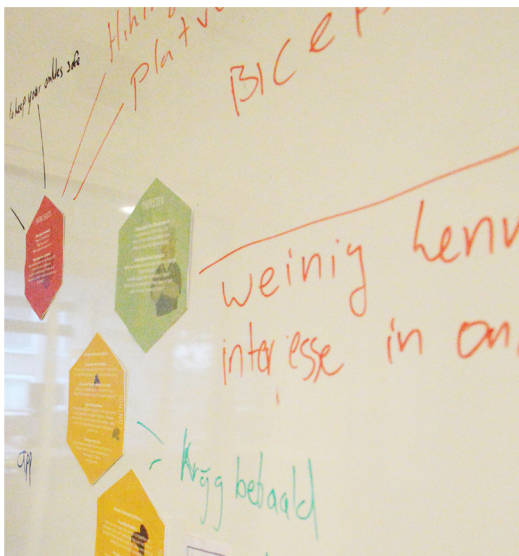
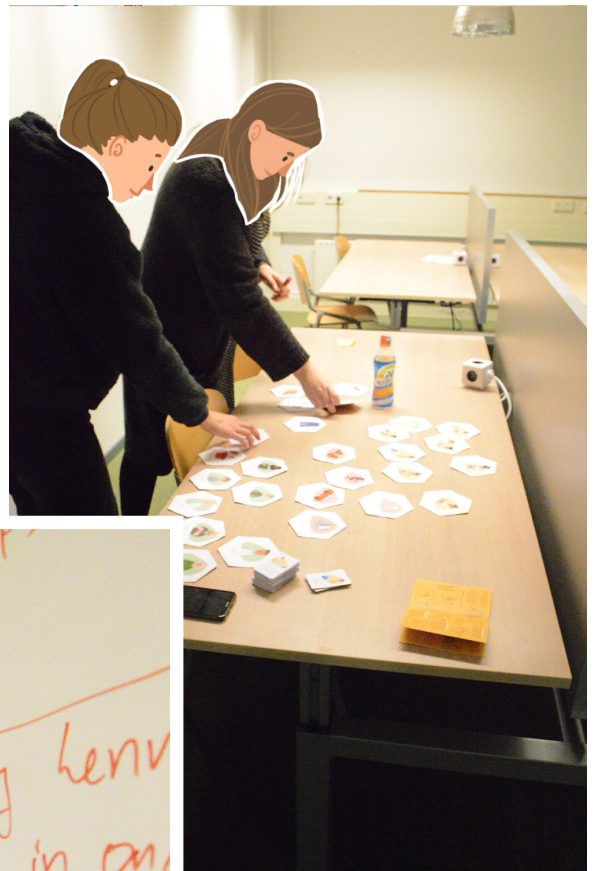
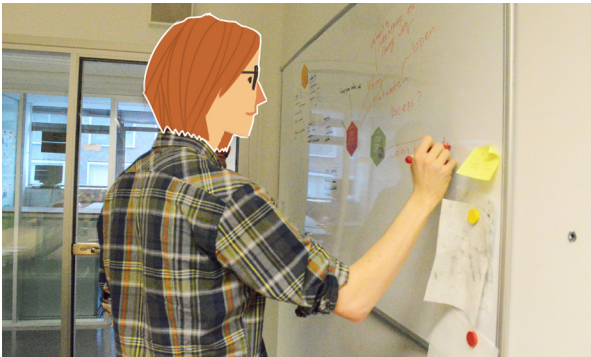
### Method

This tool was tested by simulating a short workshop with the card set. The participants were sensitized by receiving a short amount of information about Product care a few days prior to the test.

Before working with the tool the participants were asked questions about their expectations, first thoughts and of

the tool on first sight. All questions were prepared beforehand but were asked in an open conversation.

The participants were asked to perform the example process given in the information booklet, for this see page 90. They were asked to first follow those steps and were allowed to continue the process according to their preference. During this I observed their process and behavior. Afterwards they were questioned about the content of the tool and the process.





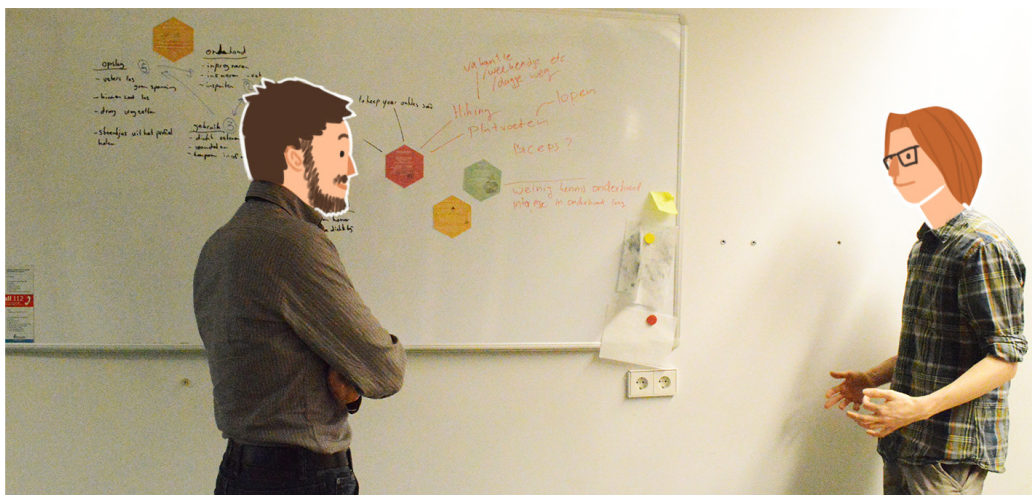
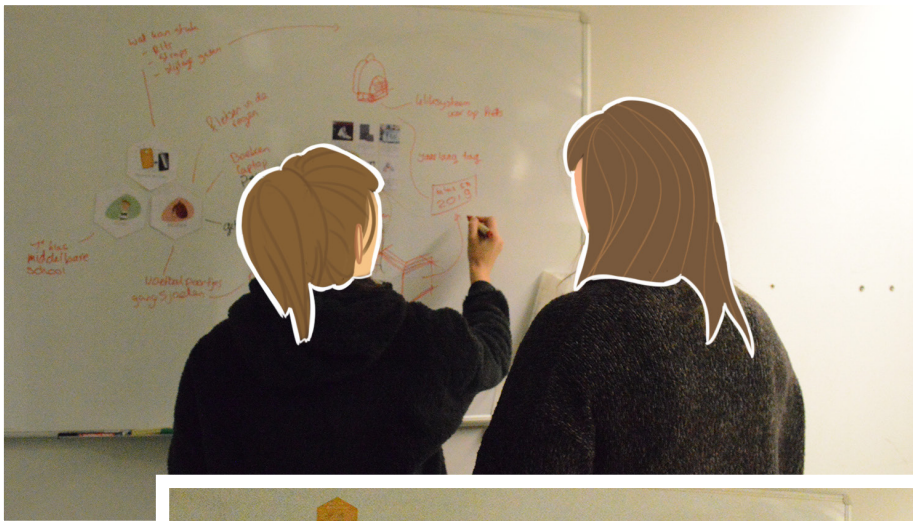
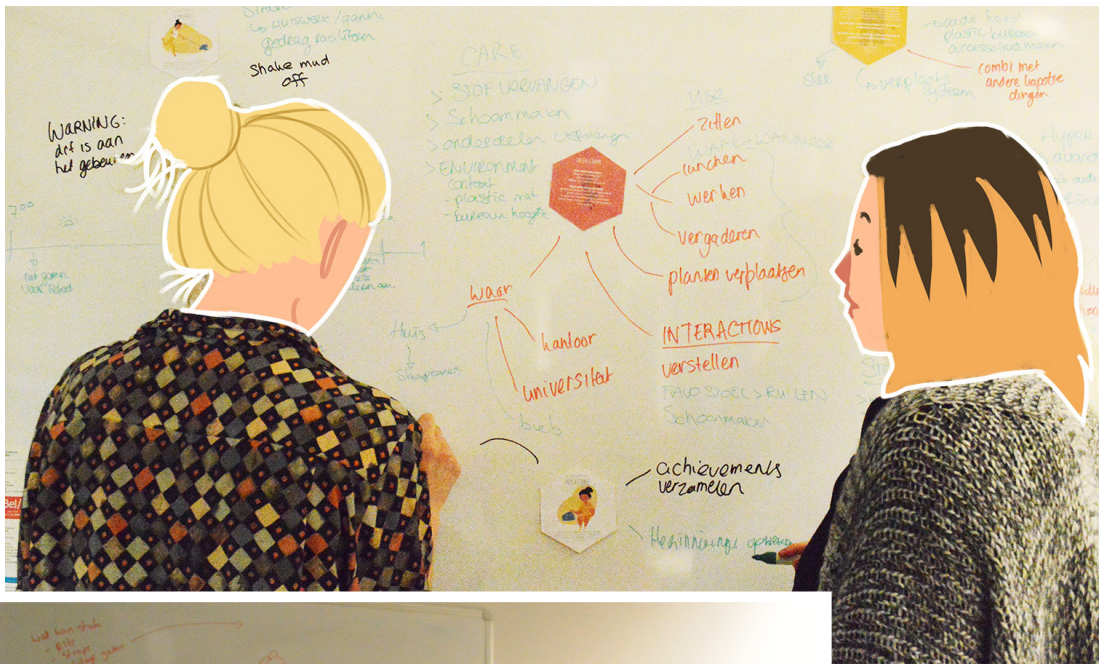


Fig 5.5.2.1 Examples of the tests of the second design tool iteration

## 5.5.3 Discussion

### **Focus during process**

During the test I looked at how the different teams worked through their process. The group with 2 interaction designers spend more time on describing/drawing the context in detail. They spend a lot of time defining the user persona, the types of behaviors they performed and the environment.

The integrated product design students spend more of their time focusing on defining the product and the type of product care it needed.

The mixed group of IPD and interaction designer spend an equal amount of time on the user persona and the product. They do however spend more time than the others on defining the most interesting Product care Behaviors, the most interesting Design Strategies and on ideating.

It showed that depending on the designers' focus they spend time and effort on the part that they found most important or were the most familiar. However, they still paid attention to the other aspects. Their feedback showed that different participants found different aspects of the process more important or interesting. The process was flexible enough for designers to adapt it to their liking.

### **Results of process**

The results of the tools varied per team. The team of interaction designers had a detailed visual map of the whole context, but very little concrete product solutions. The group of IPD students only had a small overview of the context, but their

result was that they had been discussing everything together and had many fruitful insights into what influenced their desired Product care and which activities exist. The mixed team however had a compact visual map of the context, describing the user, the product, the desired behaviors and had also managed to come up product solutions for multiple Product care behaviors.

**“Perhaps you need a more concrete goal that you’re working towards. Like, with Creative Facilitation.”**

~ an IPD student  
(about an IDE course)

This shows that one’s expertise can have a great influence on the results. This means that the information booklet or the workshop facilitator could propose a more concrete goal that the group can refer to. Usually workshops have a goal, such as being able to present one concept at the end. None of these results were wrong or bad, but if the goal of the tool is to in the end have a few design directions, a clear goal has to be set in the beginning.

### **Information booklet**

The participants were asked to follow the instructions in the information booklet.

**“Could you perhaps stimulate designers to pick more than one card? To try different thinking directions?”**

~ a DFI student

Participants mentioned that some steps were placed rather late in the process, such as adding a persona card and checking the example cards. The example process in the information booklet also did not present those that prominently. This resulted in some participants not reading it fully during the process, or even forgetting about it. Because they were less focused on the specifics given in the booklet, two groups did not think about alternating the cards at the end, even though it was proposed in the booklet. This became clear after participants asked if they could not have tried more cards, or proposed to stimulate grabbing multiple cards. This shows that the presentation of the information booklet should be more clear, not only in its wording but also visually.

### **User persona card**

The user persona card, in each of the three sessions, led to a ‘*silly phase*’ in the participants’ process. This is a phase, in

**“Persona-card could have come earlier. Then we would also have linked it better to the product, and to their type of behaviors and to what the problem is.”**  
~ a UX designer

which participants are able to think very creatively (sometimes unrealistically) and this can have an inspiring and positive influence on a brainstorm or ideation process (Buijs & van der Meer, 2013; Tassoul, 2009). This however happened after most of the context mapping had

already been finished. If the *silly phase* happens at the beginning of the context mapping process, the tool can utilize more of the designers’ creativity. This means that in the next version, the persona has to be introduced earlier in the process.

### **Example cards**

The example cards had a positive influence on the ideation process, but the step in the information booklet mentioned it as last. After the participants read the examples, the ideation process received a boost. If these had been presented earlier, that creative boost may have been utilized more.

Two participants mentioned that some examples seem to be similar to each other. For the final version these have to be filtered out and changed into a different product solution to ensure variety.

### **Uniformity**

The cards were not fully uniform in their graphic design. For example, the Design strategy cards have a title ‘*Design Strategy*’, the other cards do not. Participants mentioned that it would help if it would be clearer which cards represent which step. It was also confusing that the Design strategy cards and the Product care cards had the same colour. The participants advised to be more consequent with the graphic design to help communicate the process. Although, even if everything is explained in the information booklet, I should assume that people do not fully read a manual. Therefore I shall try to support them with the graphic design.



# 5.6 CHAPTER CONCLUSIONS

The feedback from other design students, the reflection on existing design tools and the tests of the iterations has enabled me to give recommendations for the final design tool and to answer the sub-research question.

*“What do designers need to be able to implement Product care into their design?”*

The 5 main things that designers need, based on the requirements and results from the test, are:

- *flexibility of process*
- *a sense of structure*
- *concise information*
- *examples*
- *implementability into standard design process*

## **Flexibility of process**

After the test of the walkthrough template it became clear that it did not offer enough flexibility for an ideation tool. After improving this for the card set, the flow of brainstorming was better which could be seen in the generation of more variety in output on the questions of the cards. There is not just one type of designer. Even within one university there are already multiple types; with their own preferences, methods in a design process, focus points and knowledge. One of the requirements

of this tool is that it should be usable for small groups of designers, so it should be able to match the different participants in a session.

The format of the tool also impacts the flexibility. The cards from the card set can be used as a discussion-starter, as fragments to focus and draw/write around, it can be used on paper (sitting down) or in a more active session on a white board (while standing up). It can be used individually, but also in small groups. The designer can choose to use cards from all categories, or decide to focus on one or a few. This means that the format of the second iteration is effective.

Also, in this research I have not compared the output of different tools for Product care. I have focused on which requirements a tool has to meet to enable designers to include designing for Product care in their overall designing process. To keep the door open for different ways of Product care, flexibility in the tool is needed.

Some participants mentioned that they would want to use it even before their ideation phase, to get an overview of the context in which their product will be used. Other participants said they want to use it somewhere later in the ideation phase



when they have an initial concept that can be redesigned or iterated upon.

### **A sense of structure**

This can seem contradictory after the previous paragraph, but structure is an important aspect for a design tool. Because this tool focuses so much on flexibility for brainstorming and ideation, it is important that there is still some sense of structure that designers can hold on to. Otherwise the tool might be considered too chaotic.

### **Concise information**

Especially during the test of the walkthrough template it became clear that the amount of questions and information presented could be overwhelming to participants. This was tackled in the card set by reducing the amount of questions and text and using separate cards to present pieces of information. This made it more manageable.

The reduction of written information and questions does not mean the designers receives less information or knowledge. The tool does its work when it comes to teaching a designer about Product care, which facettes are important to think about and what possible design strategies could be.

Because it is expected that the tool will be used in group format, whether it is in a lecture or workshop, I expect that additional information can be given externally by a facilitator or lecturer. This means that the tool can be more concise with the amount of information it provided. For example, this means that less space and text needs to be spend on

explaining topics such as the Circular Economy or convincing people through the text about the importance of product care.

### **Examples**

Examples are very important things for designers to be able to implement Product care . Designers almost always require inspiration or a form of stimuli when ideating and brainstorming.

With this tool the designers receive new information about Product care types and design strategies. It helps designers to get an understanding of how these can be implemented in design if you provide them with examples which they can derive inspiration from. In this tool this is done in three ways, in the design strategies, the example cards and the information booklet. The design strategies are examples of directions that a designer can think in. The example cards present different forms of implementation of the design strategies. And the booklet provides an example of a process with the design tool.

Another important form of examples are the product cards, the persona cards and the product care type cards. These all present the user of the tool with possible products, users, and type of behaviors, in other words, examples. These function as stimuli for the creative process and are at the same time something concrete that the designer can focus on.

### **Implementability into standard design process**

Because designers are taught to follow a certain designing process, it is important

for the design tool to be implementable into those processes. Due to the openness and flexibility of the tool, designers have more options of implementing the tool. As mentioned by participants, they saw possibilities for the Analysis phase and Ideation phase.

If a design tool were too intrusive, or fixed in the way it can be implemented, the chance is high that it might not be interesting for designers to use and therefore it misses the whole purpose.

### **Requirements**

Reflecting back on the requirements that were presented in Chapter 5.4, the card set fulfills the requirements according to feedback from the participants during the test. Of course, the amount of participants was quite low, so it is unwise to make strong statements about the results. It would be advised to further test it with more designers. Also, some requirements cannot be validated through interviewing the participants. Take for example, a requirement such as: *'It should be clear to the user of the tool what the main message of each strategy is and have an idea of how that can be translated into a design.'*

Participants may say that they understand the strategies and are able to provide an example of them, it can still be difficult to say for certain that they fully understand it.

This also makes me think. Is the aim, to give designers a good amount of understanding of the topic of Product care, or is the focus to make them understand it in detail.

I believe that, since this is an upcoming topic, that a global understanding will

suffice. As long as that helps designers to better reflect on their design and are able to produce some new ideas on how to create this sustainable behavior change.



# 6

## FINAL DESIGN

This chapter presents the result of this Graduation assignment, the Product care kit. This final design tool will be discussed and the different elements of the tool will be elaborated, such as the different sets of cards, the information booklet and what kind of result can be expected. At the end of this chapter recommendations for the further improvement of this tool will be given.



# 6.1 INTRODUCTION

In Chapter 5 I presented the development and evaluation of the design tool and discovered what designers require for it. In this chapter I will present the final version of the design tool for Product care, the Product care kit, the way it can be used and examples of the outcome of the tool.

This final design is the embodiment of the answers of to the research question:

- *How can a designer stimulate a user to perform Product care activities?*

To show how the answers materialize in the design tool, I will illustrate the final design by talking about how Product care is communicated, how it presents the possible design strategies for Product care, and how it helps a designer to implement it into a design.

# 6.2 PRODUCT CARE KIT

The tool presented in Chapter 5.5 has evolved into an improved version. The base has remained. Changes have been made in the descriptions and questions on cards, the uniformity of the graphic design and the explanations given about the process. The tool was deemed useful and inspiring in the test, so no drastic changes had to be made.

A summary about each part of the tool and the alterations which have been made, such as the separate cards and the information booklet, follow.



Fig 6.2.1 The final design tool





Fig 6.2.2 The revised booklet (above),  
The old version of the booklet (right)



## Information booklet

The information booklet is a folded booklet with on one side brief information regarding the topic circular economy, product care and a summary of the contents of the kit. This information booklet was difficult to read, due to a small font and little space. The size of both the booklet and font have been increased.

The backside of the information booklet presents an example of how the cards can be used. This has changed the most compared to the rest of the tool. This side of the booklet was meant to capture the attention of the designer. I restructured the lay-out, defined the individual steps clearer, added examples of the cards per step, and

increased the font size which resulted in a clearer and better readable booklet.

Another big change is the order of the steps. The persona card has been moved to an earlier step because that step helped to boost participants' creativity. The design strategies and examples have now been combined in one step because the examples were sometimes forgotten. This helps to make use of the examples during the process. In the previous version they were mentioned too late and due to this not used at all.



Fig 6.2.2 The 7 product care type cards (above),  
One product care type as example, front and back (below)

## Product care type cards

The product care cards present the 7 different types of Product care.

- *repair*
- *creating something new/different*
- *product revival*
- *preventive measures*
- *small care*
- *instructed & mindful handling*
- *routine acts*

To clarify the type of cards, these cards have received a title on the front 'product care type' and have received a thick blue border to distinguish them from the rest.

The back of the cards present a short explanation about the type of product care, ask one or a few questions to make the designer think about this type of product care.

At the bottom a few design strategies are proposed for this type of product care. These have been used often for this type, in the examples found in Chapter 4.5.

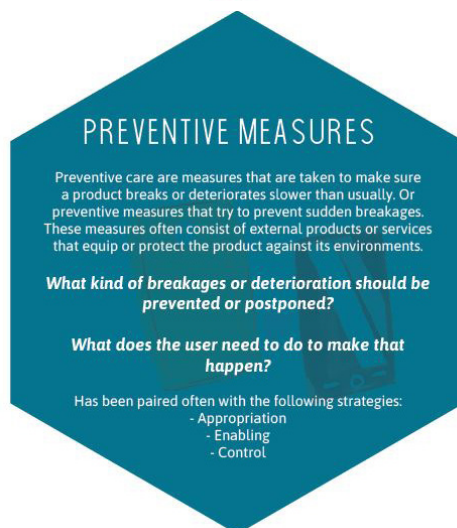




Fig 6.2.3 The 8 design strategy cards (above),  
One design strategy card as example, front and back (below)

## Design strategy cards

The design strategy cards present the 8 different design strategies for Product care.

- *experiences*
- *enabling*
- *change*
- *informing*
- *reflecting*
- *social*
- *control*
- *appropriation*

These cards have received a thick border to be distinguished easier.

The front of the cards present a short description of the tool. The back of the cards present the different sub-design strategies. These have been presented through asking questions, mainly through ‘How can you’ - questions, to inspire thinking about how something can be solved.





*Fig 6.2.4 The 8 persona cards (above),  
One persona card as an example, front and back (below)*

## Persona cards

The persona cards present 8 different inspirational personas. These have been chosen and illustrated in this fashion so the variety of users is so broad, that designers always can pick a persona that is representative for their targeted user or can inspire to think of the variety of users that can be targeted.

To clarify the type of cards, these cards have received a title on the front 'persona card' and have received a thick green border to distinguish them from the rest.

The back of the cards ask questions that makes the designer think about who their persona is, what characterizes them and what can be expected of their behavior. These questions are all the same for each persona.



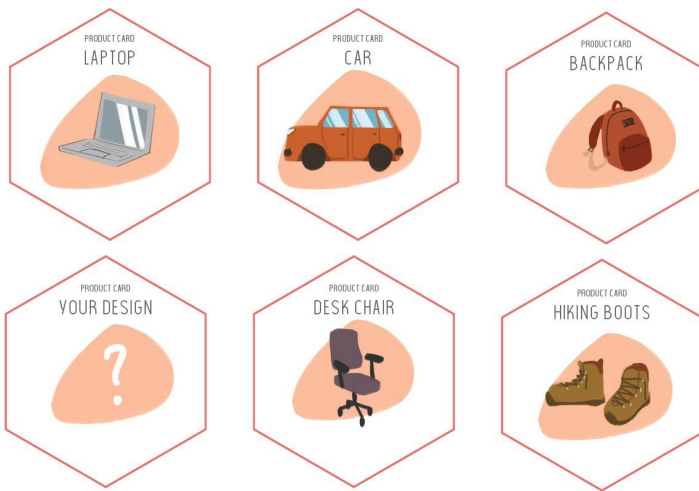


Fig 6.2.5 The 6 product cards (above),  
One product card as example, front and back (below)

## Product cards

The design strategies cards present the 5 different products that can be used for inspiration and 1 card for when designers have a product or service they want to design for.

These cards have received a thick border to be distinguished easier. The front of the cards present a short description of the tool. The back of the cards ask questions that makes the designer think about the product, the interactions that happen between the persona and the product, and the connections between the types of product care and the product. These questions are the same for each product.



**Think about this product:**

- Why do you use it?
- How do you use it?
- Where and when do you use it?

**Think about how it is treated:**

- What interactions does the user have with it?  
(From pre-purchase to disposal)
- In what non-intended ways is it also used?
- Which forms of product care can be applied to this product?



# 6.3 TOOL'S RESULTS

In Chapter 5 it becomes clear that different results are created by using the tool. In the final design tool a step was added to the beginning of the process to make designers think before starting their product care design process, what their goals are of introducing the design tool in their design proces. On the next few pages I will present a few examples of the results of the test from Chapter 5.4. What needs to be kept in mind is that it is expected that a brainstorming process with the tool will take up at least an afternoon, to ensure participants have really been submerged in the topic and can come up with deeper and thought-through ideas. These results have been created in little less than an hour. This means that they cannot be considered as fully developed and of the same depth as results after a 3 hour session.

For each group I will present the uniqueness of their results. This will give a collection of possible results designers can expect or aim for when using this design tool.

## Results group 1

The results of the group of a DFI student and a UX/UI designer can be seen in Fig. 6.3.1. This group spend a great portion of their time on the user and the interactions between the user and the product, also see Chapter 5.5. This led to:

- A rich persona, they not only described his personality but they also gave him a short backgroundstory. See Fig. 6.3.2.
- A timeline presenting a day out of the life of the persona, and referring to the moments were the persona interacts with the product.
- Many small directions that could be used as inspiration for a conceptual design. They did not pick out a direction in the end due to time restraint, but they had a lot of small ideas for design directions, to continue with, if they would have had the time. See Fig 6.3.4.

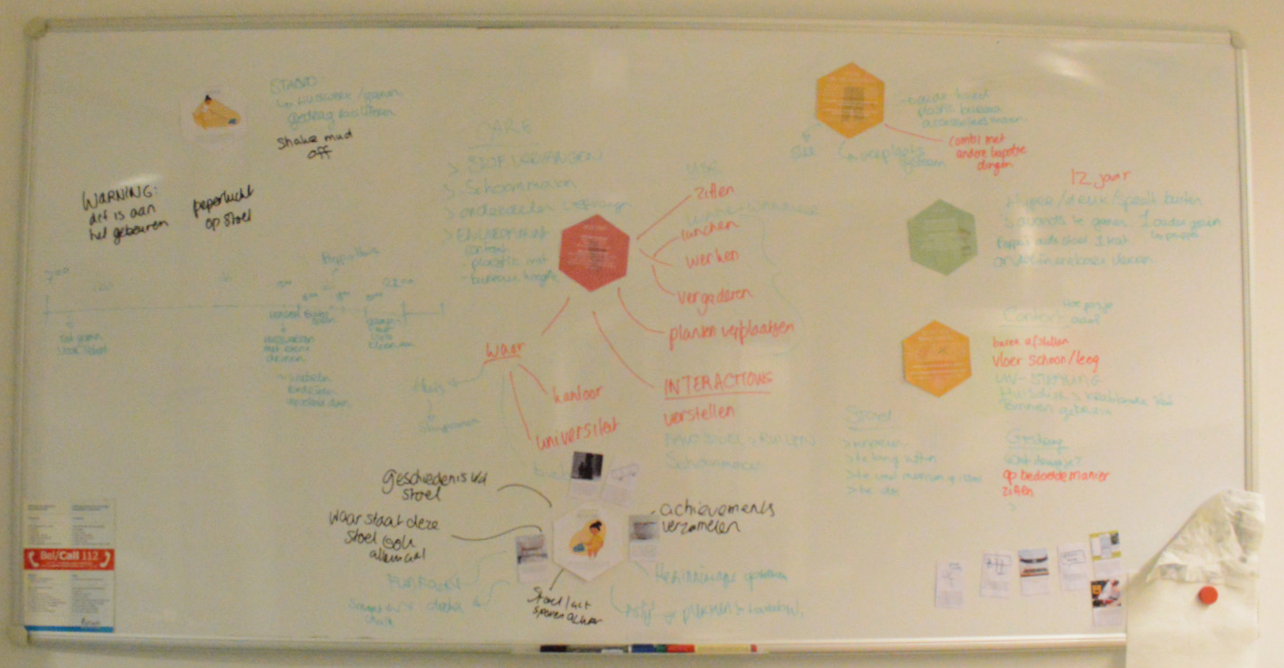


Fig 6.3.1 Overall results of session group 1

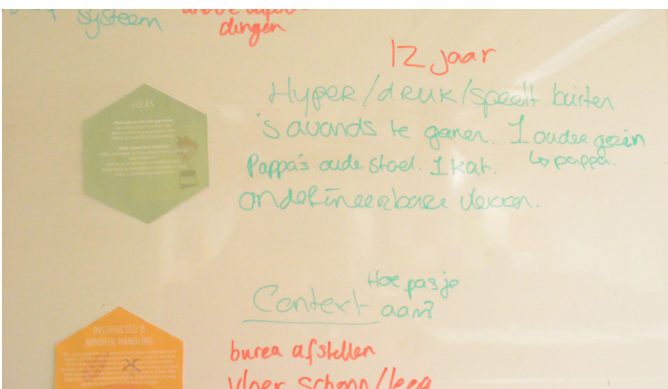


Fig 6.3.2 Description of the persona

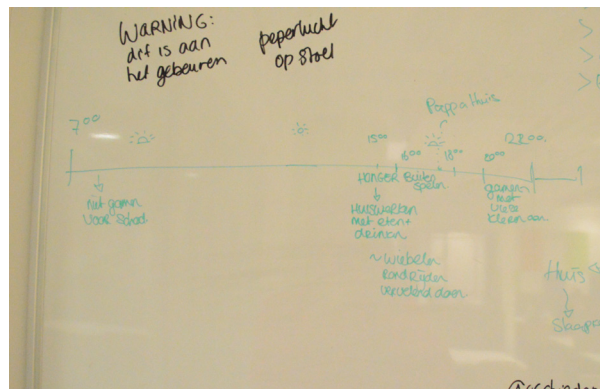


Fig 6.3.3 A day out of the life of the persona

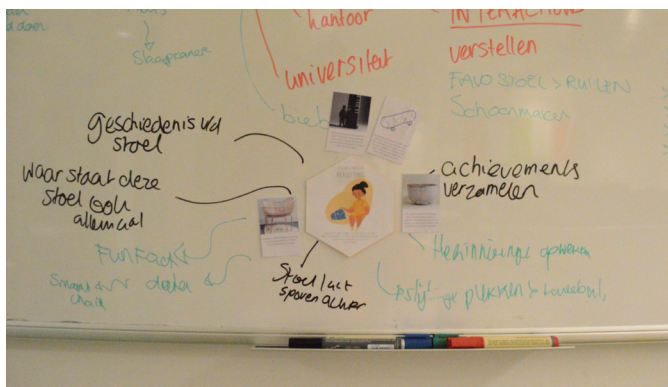


Fig 6.3.4 Inspirational directions for ideation



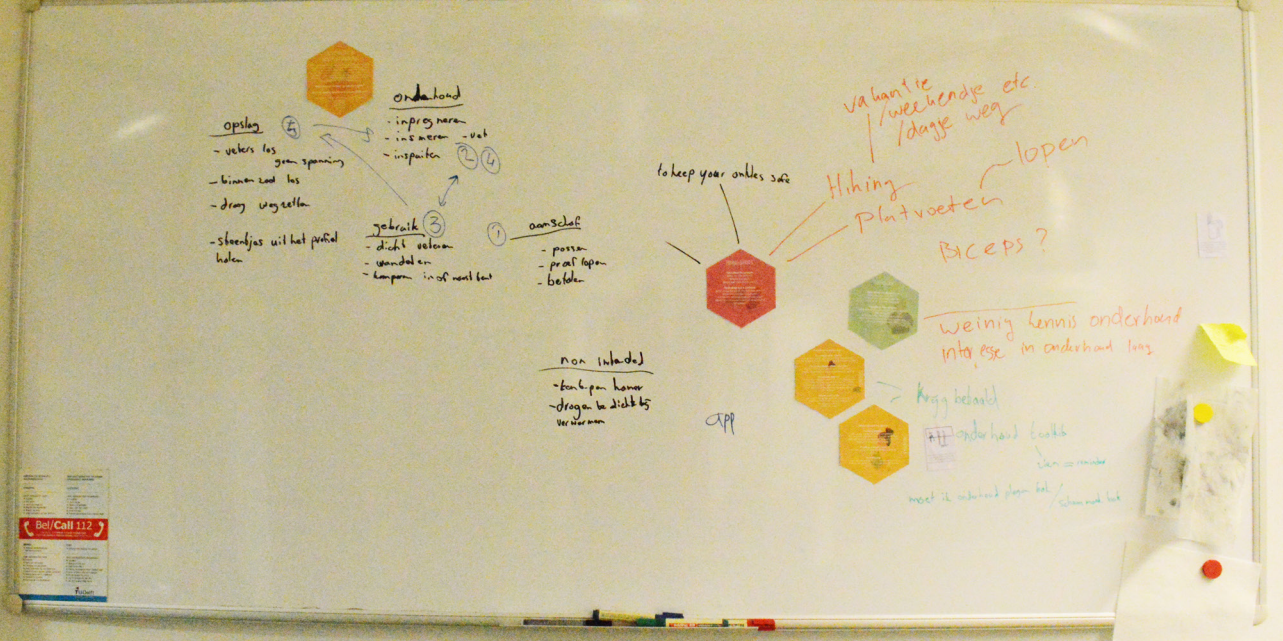


Fig 6.3.5 Overall results of session group 2

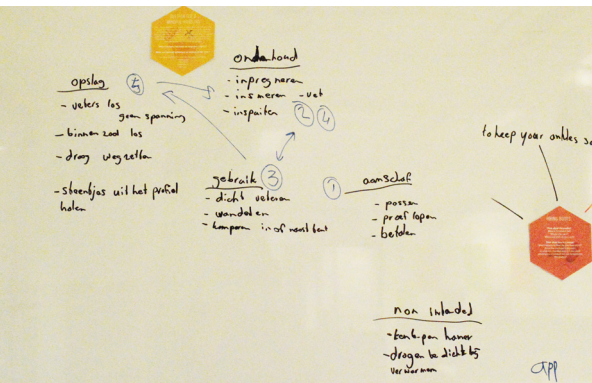


Fig 6.3.6 Overview of care activities

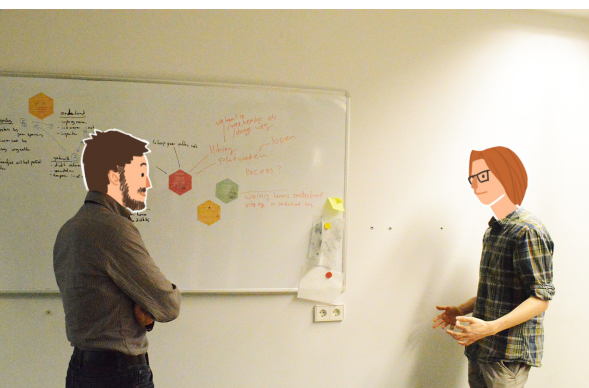


Fig 6.3.7 Deep discussions

## Results group 2

The results of the group of 2 IPD students can be seen in Fig. 6.3.5. This group spend a great portion of their time on the product and the desired product care behaviors.

This led to:

- *An extensive list of possible care activities and the connection between the different activities.* What benefitted this was that they chose a product that they were familiar with the product.
- *Discussions.* This group may have had the smallest visual map of the three groups, this group communicated and worked mostly through discussing. The results, may thus not seem as much, but they had such extensive discussions that this can also be seen as an interesting result. They discussed specifics related to the product but also many things they had learned about the product through first hand experience. This helped them to also get a better feel for the context and barriers the persona may face.



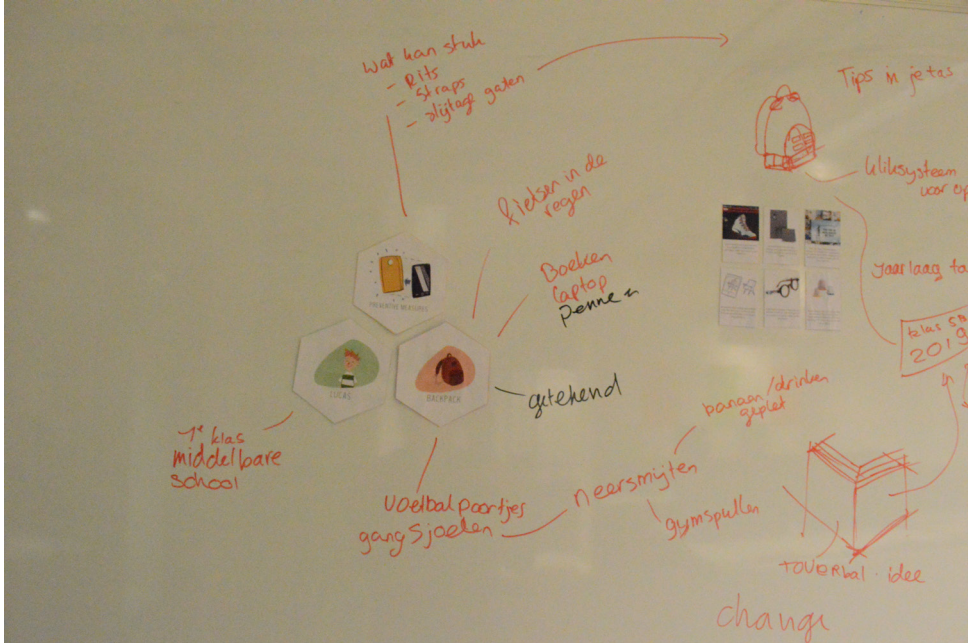


Fig 6.3.8 Overall results of session group 3

### Results group 3

The results of the group of an IPD student and UX/UI designer can be seen in Fig. 6.3.8. This group spend most of their time understanding the design strategies, the examples and on ideating. This led to:

- *Understanding of the different design strategies for Product care.* They spent less time on mapping the context they had more time to go through each design strategy and the stack of example cards. This led to them discussing a long time about which strategy was interesting for their situation and persona, which strategy had more potential or which was difficult or unexpected but might lead to novel ideas.
- *A few rough conceptual designs.* They spend a great part of their time on translating the design strategies into possible design directions. This led to a rough design that tackled a few product care activities.



Fig 6.3.9 Rough conceptual ideas

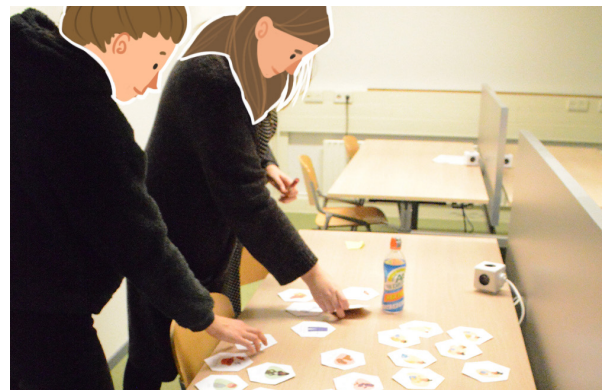


Fig 6.3.10 Spending time understanding the design strategies

# 6.4 CHAPTER CONCLUSIONS

The results differed per group of participants. This is positive and shows the potential this tool offers in developing a broad spectrum of results. If a specific type of result is aimed for you should set this at the beginning of the process as a goal.

The results can be clustered in three different types of outcomes:

- *Product-oriented*
- *Research-oriented*
- *Insight-oriented*

The outcomes that are product-oriented are product solutions or concrete design directions. This is an obvious result which you often see during Creative sessions. During creative session organized by the Creative Facilitation course at the University of Delft, the target of a workshop is often a poster or pitch of a conceptual idea. This type of result is especially useful during or at the end of the ideation phase.

Outcomes that are research-oriented are, for example, a clear map of the context. This map presents a story of the targeted user, in their environment and shows which interactions take place between the user, product and its environment. This result is similar to the outcome of

Group 1. Such a result is beneficial in the Analysis phase of the designing process, when delving into the context that needs designing for and discovering which areas are interesting for Product care.

The insight-oriented outcome is not a stand-alone result. It is often paired with the other two types. The insight-oriented results refer to the feeling and understanding that designers get for Product care, this may not be seen as a concrete result by designers themselves. Still, they have a lasting impact on designers. Making it possible for them to apply their newfound knowledge to future projects and situations.

During a session with the Product Care Kit the designer or the design team do not have to focus on merely 1 type of result. Their goal can also be to create a map of the context, educate and inform themselves and still reach a concrete product solution. It starts with the goal that is set at the beginning of the process and the design team.



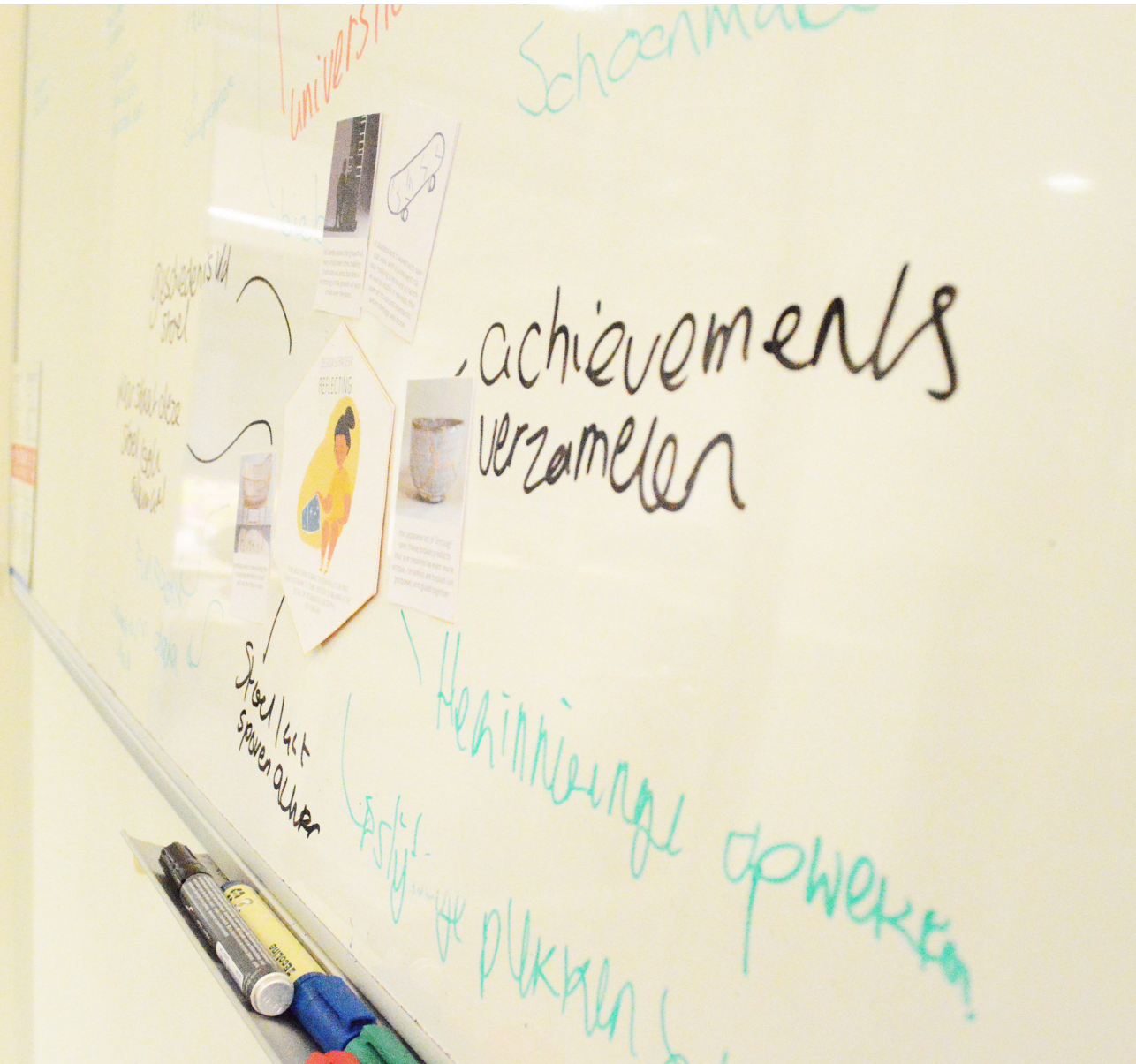


Fig 6.4.1 Example of some results of the test

# 7

# REFLECTIONS

This chapter offers a reflection overall process, the research questions and design goal of this Graduation Assignment. In this chapter recommendations for the tool will be given and after this I will reflect on my personal goals for this thesis and how I experienced my Graduation assignment.



# 7.1 INTRODUCTION

In Chapter 6 I presented the Product Care Kit, the design tool and final result of this Graduation Assignment. This chapter will reflect on the process of this Graduation Assignment and on the research questions that were posed at the beginning of this thesis. I will offer recommendations for future improvements and some personal reflections on my process.

The main research question was:

- *How can a designer stimulate a user to perform Product care activities?*

The three questions which derived from the main research questions were:

- *What is Product care?*
- *How can Product care behavior be stimulated through design?*
- *What do designers need to be able to implement Product care into their design?*

# 7.2 DISCUSSION

The goal of this thesis was to enable designers to design products and/or services that stimulate product care behavior by the consumer. I aimed to do this by developing a tool that designers can use during their design process. This tool should give them the necessary knowledge regarding Product care and the ability to implement this in their design. With this I hope that consumers will be stimulated to perform product care, so that products' lifetime will be extended. Of course, it depends per strategy if users are in control of their behavior and if it happens consciously or not. In the end, I mainly want people to make their belongings last longer.

To reach this goal I set the following question:

- *How can a designer stimulate a user to perform Product care activities?*

At the beginning of the process I expected that there would be a fixed answer on this question and that it would lead to only one logical design tool.

After reflecting on my process I see that my tool may still be expanded upon and that the design strategies could also have been implemented in a different format and would have still worked. Since I have not tested different formats I cannot validate those conclusions with test results.

## **Literature**

I had expected that by researching Circular, Emotion-centered and Behavioral design

strategies, all possible design strategies would have been covered. During the development of the strategies in Chapter 4 it became apparent that the strategy *Social* also had ties to strategies outside of the previously mentioned fields. It may be possible that if we continue to research the field of Product care, we would realize there are more (sub-)strategies to discover. However, I think the current design strategies are open and broad enough to encompass most design ideas.

## **Field research**

The research that I performed was qualitative. The diary study with end-users had 6 participants, which means I could only form qualitative and no quantitative conclusions. It is possible that I may have gotten results for 1 participant, and after finding them in 1 or 2 more participants I became victim of confirmation bias. This, I cannot know for sure at the moment. To prevent confirmation bias, it would have been good to also perform a quantitative study to balance the qualitative and quantitative data.

However, I do not think it would have been that necessary in this project. Because this was a trial and error process, with a tool and design strategies that can still continue to evolve, I believe a quantitative study would not have been that useful. In this field research I was not aiming for hard evidence and validation, but exploring the different aspects of Product care and



getting new ideas and insights.

The Micro-emotion scan and the creative sessions with designers did not contribute any striking conclusions. However, they definitely led to inspiration and insights which helped the process of the research. For example, the product care types were inspired by the results of the creative sessions.

### **Development of strategies**

The strategies were based on the combined product solutions from the brainstorm session with designers, existing product solutions and my own ideation. Half of the pool of solutions resulted from the brainstorm session. This means that the participants of the brainstorm had a big influence on the development of the strategies. I believe this was tackled by ensuring that the background of designers was mixed:

- All three Masters of the IDE faculty in Delft were present, and an UX designer.
- The participants had a mixed background of Industrial design bachelors at the TU Delft, the University of Twente and Eindhoven University of Technology.

This ensured different types of solutions would be able to come out as a result from the session.

### **Development of design tool**

The design tool consisted of 3 major iterations, one of which is the final design. The first iteration has been tested with 4 participants. The interviews were qualitative and the participants were mixed (1 DFI student, a bachelor student, a UX

designer and a MPD student from the University of Twente). Despite the small pool, the participants combined a variety of disciplines and bachelors studies and this led to a very helpful feedback and it covered all areas, depending on what the designers found important.

The second iteration was tested with 3 groups of 2 designers, and the same argument counts for this test. Whereas here I was working with 2 UX designers, 2 IPD students and a DFI student.

During the tests of both iterations the participants were all Dutch. This can mean that some strategies or examples are not automatically understood, some ideas are typically Dutch design or used for typical Dutch situations (such as solutions related to bicycles). For the test of the card set I do believe that this was beneficial, this allowed participants to brainstorm and ideate in their own language. This also meant that during the interviews there were no problems related to translating, or finding the right formulation of words, for participants or interviewer.

### **Final design**

The final design has not been tested, since it is the improved version of the 2nd iteration, the brainstorm card set. This version should be further tested, to make the last corrections before it should be produced or be considered for educational purposes.



# 7.3 RECOMMENDATIONS

A design can always be further improved and the same counts for the final design of this Graduation assignment. There are several recommendations that can be made related to the Product Care Kit.

## Validating the outcome

Before the Product Care Kit can be used in real situations the results of the design tool need to be analyzed and evaluated.

### **Designers brainstormsessions**

The design tool has only been tested with design students and designers in a shortened session. It is expected that the tool leads to product ideas, newfound insights and an overview of the context. It is important to test the tool in more realistic sessions, where designers get the opportunity to finish the whole process.

### **End-user evaluation**

There were no concrete outcomes of the tool, the focus has been on the development and testing of a tool for designers. The ultimate goal, an increased awareness and stimulation of product care by users, was not in the scope of this thesis. In this thesis however the focus has been on the enabling of designers to contribute to those goals.

To validate the tool, it would be advised that a few conceptual solutions were developed by designers in a

brainstormsession. And to discuss with end-users in which way those ideas influence their behavior to product care. Prototypes could be developed and tested with end-users.

## Spreading the knowledge

At the moment, the tool is only available for those who can get their hands on a hardcopy. Ideally, the tool should be more openly available so more designers can implement Product Care into their design.

### **Availability**

To ensure that more designers can educate themselves in the field of Product Care, the tool should become easier to access. Online availability of the tool would ensure that the knowledge about how to design for Product Care is digitally accessible. For this, I would advise that a website be build. This website should present the design strategies and present more examples for the different sub-strategies and it could offer a printable version of the kit.

### **Education**

The best strategy is teaching students about Product care (and designing for Circular Design in general). If bachelor students learn how they can incorporate Product Care in their first product and practice it multiple times, the chances are high that they will do that automatically in

future products. In this way designing for Product Care will eventually just become 'designing.'

When teaching design students it includes the opportunity of the testing of prototypes (which incorporate Product care) with end-users to validate the (sub-)strategies.

## Product Care Kit

To ensure that the Product Care Kit can be used in professional settings, some attention may need to be spend on the styling.

### **Cards**

The cards make use of magnetic strips in the paper. This makes the cards a bit uneven and made it difficult for some cards to stick to the whiteboard. Ideally, the cards are smooth and hard, with an even magnetic layer in it. For the final cards, it would be best if the card can be written on (and erased), especially for the Product cards and Persona cards, making it possible to customize it.

Another thing that could be looked into is the stylization of the illustrations. These may be considered feminine. Even though male participants said they did not mind the feminine style, in the theme of gender equality it may be a nice idea to also add male figures in the design strategy cards. Another possibility is adding a few 'typically masculine' product care activities.

### **Storing the tool**

Some time should be spend on the presentation of the tool. A box where the cards are stored in could make the tool visually more attractive and look

more professional. If it were to be used in workshops, it would be smart if the facilitators could bring it along easily.

## Format

The tool was meant to be used on a whiteboard and this type of use has been tested.

### **Horizontal brainstorming**

The cards have only been tested on a whiteboard. This is because the standing up setting of working at a whiteboard can feel more energetic than working sitting down. It is possible however to use the tool horizontally on a table/piece of paper. This type of setting should be tested to see if it has the same feeling and mood as the whiteboard setting. Based on teaching from Creative Facilitation, there is a big difference in sitting down around a table while brainstorming. The mood and tempo of such a session is often calmer, it may lead to a slower ideation pace.

### **Internationally understandable**

As was mentioned in the discussion, all the tests during this thesis have been done with Dutch people. In the future we should check if the strategies and example are also understood by designers with different background. What might be interesting to look at is if there are product examples that can be added from different cultures. If there is an online database with product examples were designers can upload examples. In this way there is more inspiration that designer can derive from and a higher chance designers (from other cultural backgrounds) will understand the strategies.

# 7.4 PERSONAL REFLECTION

Before I graduated I decided I wanted to learn more about Circular, Behavioral and Positive design. I have been interested in the human side of design since my Minor in Psychology and I expected to increase my in-depth knowledge of specific methods. Instead I achieved a general knowledge and valuable insight in a broad range of theories. I had anticipated a substantial influence in the project from the perspective of Positive design. This turned out not to be the case. In the end, Positive design did not have that much influence in the project as I had expected.

In hindsight I would have liked to further test the final tool and test the results of the tool with end-users, but due to time constraints I could not alter my planning to include this in my research.

I am proud of the results I booked, I wanted to create something that would be useful for designers and contribute to the knowledge pool about sustainable behavior change. With the design strategies and a design tool as results, I feel that I did manage to contribute to this goal and added some steps when it comes to Product care. It does feel like work is not finished yet, and I still want to continue developing the tool and to research the strategies even further.

I do hope this is just the first step of this research and that my tool and research will in the future have a positive impact on the shift towards a Circular Economy.

Looking back, this project has had a meaningful contribution to my own development. It has been an enjoyable experience for me. Although not many students would consider graduating enjoyable, I really did. I got the chance to practice facilitating creative sessions, it gave me the opportunity to use my visual skills and I got to learn more about how to design for behavior change. And most of all, it made me realize that I enjoy doing research, and that I would like to learn and contribute more towards (sustainable) behavior change.

# REFERENCES

- Ackermann, Laura & Mugge, Ruth & Schoormans, Jan. (2017). *Consumers' attitudes towards product care: an exploratory study of motivators, ability factors and triggers*. 10.3233/978-1-61499-820-4-1.
- Ackermann, L. (2018). *Design for Product Care: Enhancing Consumers' Repair and Maintenance Activities*. Design Journal, 6925(May), 1–9. <https://doi.org/10.1080/14606925.2018.1469331>
- Ackermann, L. & Mugge, R. & Schoormans, J. (2018). *Consumers' Perspective on Product Care: An Exploratory Study of Motivators, Ability Factors, and Triggers*. Journal of Cleaner Production. 183. 10.1016/j.jclepro.2018.02.099.
- Bakker, C.A., & den Hollander, M. (2014). *Products that last* (1st ed.). Marcel den Hollander.
- Bakker, C A., Wang, F., Huisman, J., & den Hollander, MC. (2014). *Products that go round: Exploring product life extension through design*. Journal of Cleaner Production, 69(April), 10-16. <https://doi.org/10.1016/j.jclepro.2014.01.028>
- Bhamra, T., Lilley, D. & Tang, T. (2011). *Design for Sustainable Behaviour: Using Products to Change Consumer Behaviour*. The Design Journal. 14. 427-445. 10.2752/175630611X13091688930453.
- Board of Innovation set* (2017, December 14) Retrieved from: <https://www.boardofinnovation.com/tools/>
- Bocken, N. M. P., de Pauw, I. Bakker, C.A. & van der Grinten, B. (2016) *Product design and business model strategies for a circular economy*. Journal of Industrial and Production Engineering, 33:5, 308-320, DOI: 10.1080/21681015.2016.1172124
- Boulding, K. E. (1966). *The economics of the coming spaceship earth*. Environmental Quality in A Growing Economy, 3–14. <https://doi.org/10.4324/9781315064147>
- Buijs J., and H. van der Meer (2004). *Professioneel wyberen: Het organiseren en leiden van creatieve sessies*. Boom: Amsterdam, The Netherlands.
- Casais, M., Mugge, R., Desmet, P. (2016). *Using symbolic meaning as a means to design for happiness: The development of a card set for designers*. Proceedings of DRS 2016, Design Research Society 50th

Anniversary Conference. Brighton, UK, 27–30 June 2016.

Chapman, Jonathan. *Design for (Emotional)*

*Durability* (25:4 Autumn, 2009), 29–35. doi: 10.1162/desi.2009.25.4.29

Chapman, J. (2015). *Emotionally durable design* (2nd ed.). Taylor & Francis Ltd.

Daae, J. Z., & Boks, C. (2014). *Dimensions of behaviour change*. Journal of Design Research, 12(3), 145. <https://doi.org/10.1504/JDR.2014.064229>

Eger, A.O., Bonnema, M. E. L. (2010). *Productontwerpen* (4th ed.). Boom Lemma Uitgevers.

European Commission. (2017). *Critical raw materials*. Retrieved October 24, 2018, from [http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical\\_nl](http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_nl)

Fogg, B.J.. 2009. *A behavior model for persuasive design*. In Proceedings of the 4th International Conference on Persuasive Technology (Persuasive '09). ACM, New York, NY, USA, Article 40, 7 pages. DOI: <https://doi.org/10.1145/1541948.1541999>

Fuad-Luke, A. (2002). *Slow Design, a paradigm shift in design philosophy. Development by Design*, Bangalore, India, 44(0), 01–02. Retrieved from <http://www.arts.ulst.ac.uk/artm/courses/jdmm/emotion/slow-des.pdf>

Government of the Netherlands. (n.d.). *From a linear to a circular economy*. Retrieved from: <https://www.government.nl/topics/circular-economy/from-a-linear-to-a-circular-economy>

<https://www.government.nl/topics/circular-economy/from-a-linear-to-a-circular-economy>

Green, M., Ryder, B., Monaghan, A., & Levett, R. (2006.). *I will if you will*. <https://doi.org/10.1007/s10551-008-9907-9>

Guiltinan, J. (2009). *Creative destruction and destructive creations: Environmental ethics and planned obsolescence*. Journal of Business Ethics, 89(SUPPL. 1), 19–28. <https://doi.org/10.1007/s10551-008-9907-9>

Haines-Gadd, M., Chapman, J., Lloyd, P., Mason, J., & Aliakseyeu, D. (2018). *Emotional durability design Nine-A tool for product longevity*. Sustainability (Switzerland), 10(6), 1–19. <https://doi.org/10.3390/su10061948>

London, B. (1932). *Ending the depression through planned obsolescence*, 1–8. <https://doi.org/10.1016/j.rinp.2015.12.005>

Macleod, J (2017), *Ends. Why we overlook endings for humans, products, services and digital. And why we shouldn't*.

Mugge, R., Schoormans, J.P.L., Schifferstein, H.N.J. (2005) *Design strategies to postpone consumers' product replacement: The value of a strong person-product relationship*. The Design Journal, 8(2), 38-48.

Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2008). *Product attachment: design strategies to stimulate the emotional bonding to products*. Elsevier Ltd.

Pohlmeyer, A.E. (2014). *Enjoying Joy. A Process-Based Approach to Design for*



*Prolonged Pleasure*. Proceedings of the 8th Nordic Conference on Human-Computer Interaction (NordiCHI'14): Fun, Fast, Foundational. New York, NY: ACM Press, pp. 871-876.

Sariatli, F. (2017). *Linear Economy Versus Circular Economy: A Comparative and Analyzer Study for Optimization of Economy for Sustainability*. Visegrad Journal on Bioeconomy and Sustainable Development, 6(1), 31–34. <https://doi.org/10.1515/vjbsd-2017-0005>

Sauvé, S., Bernard, S., & Sloan, P. (2016). *Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research*. Environmental Development, 17, 48–56. <https://doi.org/10.1016/j.envdev.2015.09.002>

Strauss, C. and Fuad-Luke, A. (2008) *'The Slow Design Principles - A New Interrogative and Reflexive Tool for Design Research and Practice'*

Tassoul, M. (2009) *Creative Facilitation*. Delft:VSSD.

The Ellen MacArthur Foundation, & Foundation, E. M. (2015). *Towards a Circular Economy : Business Rationale for an Accelerated Transition*. Greener Management International, 97. <https://doi.org/2012-04-03>

The Guardian. (2011). *The six natural resources most drained by our 7 billion people*. Retrieved October 24, 2018, from <https://www.theguardian.com/>

[environment/blog/2011/oct/31/six-natural-resources-population](https://www.theguardian.com/environment/blog/2011/oct/31/six-natural-resources-population)

*Triggers card set* (2018, December 14) Retrieved from: <https://www.trytriggers.com/>

Tromp, Nynke & Hekkert, Paul & Verbeek, Peter-Paul. (2011). *Design for Socially Responsible Behavior: A Classification of Influence Based on Intended User Experience*. Design Issues. 27. 3-19. 10.1162/DESI\_a\_00087.

Van Boeijen, A., Daalhuizen, J., Zijlstra, J., van der Schoor, R.. (2013). *Delft design guide* (4th ed.). BIS Publishers BV.

van Nes, N., & Cramer, J. (2006). *Product lifetime optimization: a challenging strategy towards more sustainable consumption patterns*. Journal of Cleaner Production, 14(15–16), 1307–1318. <https://doi.org/10.1016/j.jclepro.2005.04.006>

Wikipedia. (2019). *End-of-life*. Retrieved January 17, 2019, from [https://en.wikipedia.org/wiki/End-of-life\\_\(product\)](https://en.wikipedia.org/wiki/End-of-life_(product))



# APPENDIX

In the appendix materials are presented which show more detailed results compared to the report itself or explanations of certain methods.

# CONTENTS

<b>Introduction</b>	<b>p. 126</b>
1. Project brief	p. 126
<b>Empirical research</b>	<b>p. 133</b>
2. Micro emotion scan	p. 133
3. Creative facilitation - session results	p. 137
4. Product care activities	p. 140
5. Summaries participants diary study	p. 143
6. Diary data (successful)	p. 146
7. Diary data (unsuccessful)	p. 152
<b>Development strategies</b>	<b>p. 154</b>
8. Session plan brainstorm with designers	p. 154
9. Brainstorm with designers - results	p. 159
10. Ideation results - of myself	p. 163
11. Existing product solutions	p. 168
<b>Development design tool</b>	<b>p. 173</b>
12. Iteration 1 - walkthrough template	p. 173
13. Iteration 2 - brainstorm card set	p. 180

## Appendix 2: Micro emotion scan

### *Emotion journey 'broken pedal' - detailed analysis of Fig 3.2.4 of the report*

1. Unexpected work – Annoyed/Insecure
  - i. The fact that there was something that broke only surprised me. But the fact knowing that it would take me time and effort to fix it was making me feel annoyed. Mixed in with this annoyance was insecurity. Since it was something that I had never fixed before I felt insecure if I would be able to fix it.
  - ii. The insecurity also was related to insecurities about being able to use the function, namely the driving of my bike. I was unsure now about being able to cycle to my appointments these days.
2. Enough confidence and knowledge available – Determined/Practical
  - i. Since it was a product that I had fixed and maintained before, I was confident that or I or a service would be able to fix it. I already had few ideas on how fixing a pedal might work, so it made me feel confident that everything would be alright.
  - ii. I felt determined because it would have an impact on my daily life if I didn't fix it, I really need my bike so I was determined to make it work again, no matter what.
3. One and only focus – Unfocused/Insecure/worried
  - i. Because a broken bike has so much impact on my daily life I couldn't think about anything else than my bike. Even though I knew I couldn't do anything at the moment, I still couldn't let it go. I also started to 'pieker' about doom-scenarios. What if I wasn't able to fix it?
4. Information & soothing comments/tips/advice – Optimistic/determined/open
  - i. I decided to give into my worries about my abilities to fix it by looking up information on the internet on how to fix it. This made me feel a little bit surer about myself and skills.
  - ii. After that I asked for tips and advice from my boyfriend and one of my roommates, both people who are very good at fixing bikes. They were being assuring that I would be able to do this, and they gave tips on what was the smartest to do. So borrow their tools, try it myself and if that fails, ask the bike shop to loosen the broken pedal and screwing on the new one myself.
5. Tools are easily attained – Hurried/decisive/practical
  - i. I didn't feel like having to think too much about which tools to get. I was decisive & hurried. I quickly bought the replacement part and asked my roommate for the tools. I let him decide which ones I would need. I also wrote down on a post-it which things I needed so I wouldn't need to think about it in the shop.
6. Out of routine – Stressed/tired/distracted/insecure
  - i. I started postponing the reparation moment. I felt stressed and a bit tired due to thinking about it, since it didn't fit into my day/routine. I also didn't want to start because I was afraid it might fail and then it would take me even more time to fix it.
  - ii. Also because I didn't know if I would succeed and how long it would take I couldn't decide when to fix it. I heard that loosening it could be tough, so there was a

possibility I wouldn't be able to loosen it. Do I do it before I have to cycle to my training? Should I do it afterward? Are those moments too short and should I do it tomorrow? I felt insecure.

7. Expecting failure – Insecure/anxious/reluctant/shameful
  - i. After postponing it for a day I pushed myself to go and fix it. My hopes were low and I was preparing for failing. I noticed that it looked rusty which made me feel even more reluctant and anxious about the task.
  - ii. I still felt that I should fix it, because the people around me told me that it shouldn't be too hard. I felt proud or let's say ashamed, because I didn't want to fail.
  - iii. I also felt insecure about the fact that I had to fix it in the public bike lot in front of my house, we don't have an own garden/space to do it so I felt watched.
  - iv. I even thought about buying myself some unhealthy snacks afterwards, I was already planning for failure and decided I needed comfort food afterwards.
8. Unexpected success – Hopeful/joyful/energized
  - i. Since my hopes were so low about loosening the pedal I expected nothing else than failing to loosen it and that I would need to go to the bike shop, which would take extra time. But then it suddenly loosened and I had a rush of energy and hope.
9. Afraid to get hopes up - Restrained
  - i. Afraid that I would be hopeful too soon, I restrained myself a little, just in case it went wrong. Perhaps now the new pedal would not fit in the hole.
10. Super proud! – Proud/daring/adventurous
  - i. When the pedal came off in its hole and the new one fit, I almost laughed out loud. I felt so proud and happy. I felt proud and confident about my skills.
  - ii. Not only was I happy that I managed to fix it, I even briefly thought about replacing the other one as well, overconfident now with my skills. I thought about doing a check-up on the rest. (But I realized I had other work to do, so I decided not to.)
11. Continuous confidence – Confident/airy/proud/cheerful
  - i. I felt good about myself, confident and airy/chill, I didn't feel the necessity to check the internet what to do next. I sprayed some WD-40 on it, sure that that was probably good.
12. Slight fear for being disappointed – Anxious/nervous
  - i. I went to try my bike to see if it worked, I was slightly afraid that I celebrated too early and that it would break.
13. Joy afterwards elevates mood – Joyful/extraverted/proud
  - i. It didn't break so I felt glad and joyful. I decided to use it immediately and cycle to the supermarket to buy a nice and healthy lunch.
  - ii. The joyful mood stayed with me for a while, I even spoke to someone I knew in the store, even though I usually don't feel like talking to people when doing grocery shopping.

What stands out is that a large part of the process I felt insecure. This is especially due



to the product having an important role in my daily life. Even though the broken pedal wouldn't restrict me from cycling, it would be highly uncomfortable though and my bike is something that I want to know for sure that it's working. So in this case my motivation to fix it was the fear that I would not be able to get to my appointments easily and also the total breakdown of the pedal if I chose to ignore it.

The main steps and Youtube tutorials were available online, giving me the general knowledge needed to perform the task. It seemed like a task that would not cost too much time and effort. I also have to say that because this task would be part of my research I decided it was worth spending the time, if I didn't have time during the day and would've had to do it in the evening I would have probably waited till the weekend. But the reason why I also decided to perform the care taking behavior (no matter if I succeeded or didn't) is because I had reassurance from external factors that it was (probably) possible for me, a non-expert, to fix. The reason why I felt confident enough were the tips and advice from my boyfriend and my roommate. What also triggered me to do it quickly was that when I drove my bike home I kept on hearing the pedal crack and felt it bend under my foot. Since I was constantly reminded of the broken part I couldn't ignore it for longer than 1 day.

#### Interesting negative moments

1. The annoyance or insecurity you feel when something important breaks down can be very strong. In hindsight I rather have maintained it a little every now and then instead of having to plan these hours free to fix it with the insecurity of it possibly being unfixable.
3. Feeling so insecure about my abilities made me not want to fix it.
6. Since it was out of my routine and I had to plan it, it made me postpone it.

#### Interesting positive moments

2. I was already determined and confident by myself, but that was due to the knowledge that the bike is something that I can often repair by myself or by a service and that these services are available everywhere. The knowledge that there would be manuals/videos on this helped me feel confident.
4. The assurance of an external platform or other people pushed me to do it myself. Getting the tips of 'experts' I knew it would be possible to do.
10. Since my expectations were low, I was extra proud to have fixed it myself. This made me glow from pride and joy for a while.
13. Cycling on it made my joyful and proud and even shone through in my behavior in the hours afterwards and the day after. I proudly told others I had fixed it myself. It made the bike feel a little more like 'mine'.

#### Interesting emotions to use as driver/to target:

- Pride (to gain after succeeding/finishing)

- Insecurity (to tackle beforehand, lowering the threshold)
- Joy (during the process, making it joyful/nice to perform the activity, this could also result from being able to do something unexpected)
- Optimistic/confident (to attain beforehand, to lower the threshold)

### Appendix 3: Creative facilitation - session results

Summary:

Reasons that prevented users from performing product care:

Given reasons <u>not</u> to perform product care	Factor
easy to throw away	Time and effort ( <i>Ability</i> )
product care takes too much effort	
low costs	Financial aspects ( <i>Motivation</i> )
not the owner	Shared responsibility ( <i>Motivation</i> )
not repairable	General lack of reparability ( <i>Ability</i> )
product holds no (emotional) value	
upbringing	Social triggers ( <i>Triggers</i> )
to gain a certain status	
lack of knowledge	Knowledge and skills ( <i>Ability</i> )
changing trends	Fit with participant's identity? ( <i>Motivation</i> )
incentives (new products marketed)	Social triggers? ( <i>Triggers</i> )
Have no love for the product	Irreplaceability? ( <i>Motivation</i> )
products are not build to last forever	General lack of reparability/functionality? ( <i>Ability/Motivation</i> )
no feeling of responsibility	Shared ownership/irreplaceability? ( <i>Motivation</i> )

Reasons that would make users perform product care:

Given reasons to perform product care	Factor
saving money	Financial aspects ( <i>Motivation</i> )
not willing to invest too much money	
repairing it (by a service) is expensive	
can't afford new one	
attached to it	Irreplaceability ( <i>Motivation</i> )
a new one doesn't hold the same emotional value	
proud of it	Irreplaceability, aesthetics or fit with participant's identity ( <i>Motivation</i> )
don't want to waste it	Intrinsic motivation ( <i>Motivation</i> )
to prevent breaking	
taking care of it for friends	Social triggers ( <i>Triggers</i> )
user rented the product	
really need it	Functionality ( <i>Motivation</i> )
not able to fulfill certain tasks without it	

buying a new one is a hassle	Time and effort? ( <i>Ability</i> )
difficult to obtain/buy (from a different country)	
when it's new	Appearance triggers? ( <i>Triggers</i> )
it's fragile	

There are multiple locations where people perform product care activities:

- in your home
- on the go
- at school
- at work
- at someone else's place
- a special workplace (like a shed or garage)
- when you're abroad
- in a hobby room
- while transporting it

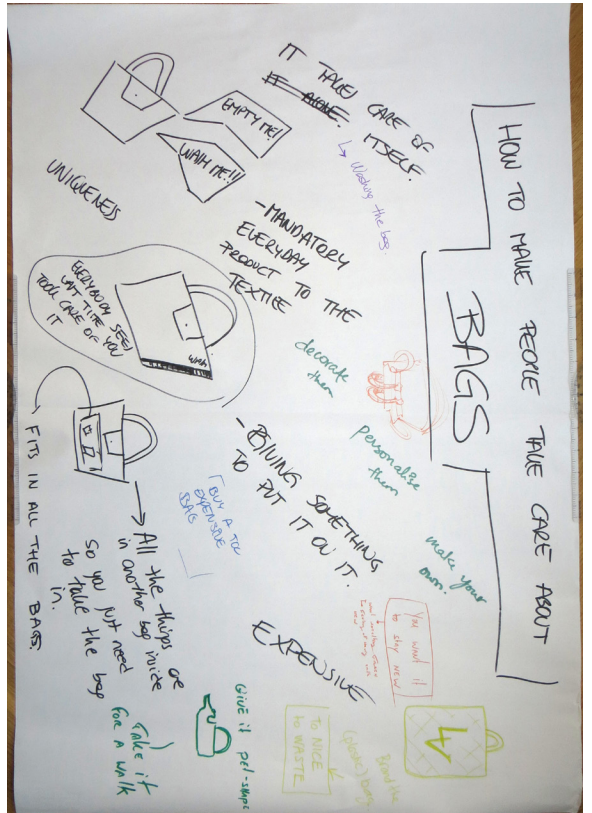
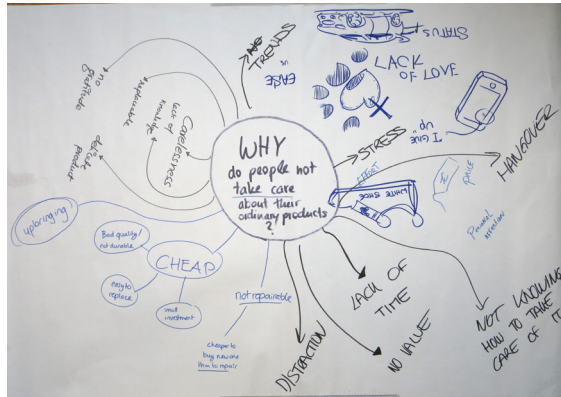
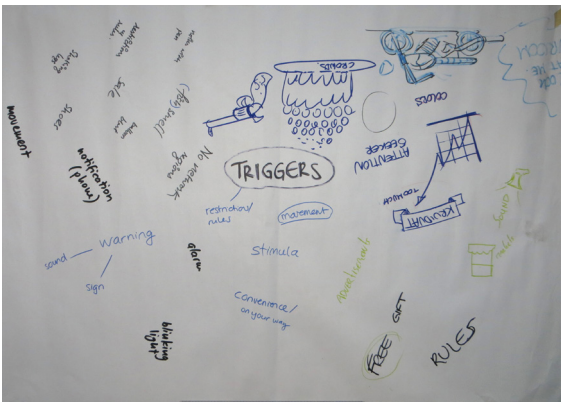
There are multiple moments that could be targeted:

- as a ritual (for example, once a week on a Monday, like 'woensdag-gehaktdag')
- right after using it, just before storing it
- during usage
- after finding it after a long time
- as a daily activity
- when the product is already broken
- just before it reaches the end of its life
- when the product affects their emotions/mood
- when the product becomes their friend (when they feel attached)
- after receiving the product from someone

Strategies:

- personalization
- personal connection
- added functionality
- reward systems
- identity (style over trends)







## **Appendix 4: Product care activities**

### **Care activities data - received from Laura Ackermann**

#### **Household items**

fixed broken mixer (that fell on the ground) with tape  
washing machine: control and clean the fluff filter; cleaning; decalcify  
decalcify the dishwasher and clean its filters  
flat iron: follow the instructions (e.g. use only distilled water)  
kitchen machine: clean after every use  
general careful handling (mixer, kitchen machine)  
informed buying decision (own research and ask for consultation in a shop); but  
(vacuum cleaner)  
vacuum cleaner: buy a well-known brand with long guarantee time and a service  
number to call in case of problems; buy suitable bags  
kitchen machine: not overstress the product  
mini-oven: keep packaging for future transport  
Thermomix: pull plug when it is not used  
cooking knives: put them not in the dishwasher, but cleaned by hand; resharpen  
pans: no cleaning with dish liquid, but only swipe out with a dry towel to build up a  
protecting oil film  
clean and decalcify coffee machine

#### **Electronic Items**

washing machine: ask service provider for repair  
install anti-virus program (laptop)  
software updates, back-ups (laptop)  
replace battery and RAM (laptop)  
use protective skins / covers for smartphones and laptops  
generally careful handling (laptop)  
avoid scratches from keys etc when carried in a bag  
use sugru to fix macbook charger  
brings laptop to service providers (regularly)

#### **transport**

Only annual (legally mandatory) check-up (car)  
changes different parts of the bike when broken (and/or keeps them for future bikes)  
wash car (at home)  
boyfriend / husband takes care (car)  
renewed old camper  
change tyre, clean and lubricate chain, replace brakes (bike)  
attention if car makes unusual sounds  
refill water of windscreen washer, check oil (car)

#### **furniture**

replace lightbulb

clean lamp  
clean all pieces of furniture  
built bed on his own  
changed cover of wing chair  
paints her furniture  
built her own wardrobe  
repair drawers  
oil for wooden furniture  
wax countertop in kitchen  
replace mattress every 10 years  
select special place for wall clock and arrange it together with matching items  
clean mattress with vacuum cleaner  
retighten screws (IKEA Poäng)  
air bedclothes regularly

### **clothes**

repair jewelry (by jeweller)  
mend jeans (by mother)  
use shoetrees and shoe polish  
wash dress by hand and not with washing machine  
use oil for wooden parts of a wristwatch  
careful handling (shoes)  
use a stapler to repair shoes  
cut loose fibres  
darn socks  
repair salopettes  
clean winter shoes after every use  
replace shoe sole (shoemaker)  
improve / modify clothes (new look, better fit...)  
clean and impregnate winter coat  
get clothes changed (tailor)v

### **sport & leisure time**

clean camping mat (washing machine)  
well-informed buying decision (sport shoes)  
impregnate sport shoes  
use sport shoes only for intended purpose (not for daily use)  
use soccer shoes only for soccer, not for running etc.  
renew coating and edges (ski)  
lacquer piano  
lubricate snowboard  
remove wax and clean; put at a safe place when not used (surfboard)  
tent: clean, let dry, wrap carefully

put favorite book in a special place so it stays „present“ in the room  
remove dust from piano  
wash according to instructions (sport clothes, sport shoes)  
tune piano

### **Personal care activities - own brainstorm**

Using phonecover  
Installing protective software for laptop  
Software updates  
Keeping spare parts of products  
Informing myself fully when buying running shoes  
Empty filter of drying machine  
Not overfilling the dishwasher  
Bring broken leather shoes to shoemaker  
Bringing leather jacket to tailor when necessary  
Repairing small damages to clothes myself  
Using superglue to fix shoes  
Changing parts of bike when (almost) broken  
Bringing bike to bikeshop if repair is needed  
Asking partner to change bike tires  
Replacing flat tire of car  
Wash clothes on prescribed setting  
Not putting the laptop on the couch/bed (ventilator can get stuffed)  
Wash delicate clothes by hand (if stated on label)  
Oil/paint/rebuild nightstand  
Cut loose fibers of clothes  
Tune piano (by professional)  
Replace guitar strings (myself or by my partner)  
Pump tires every now and then  
Blow out ventilator of laptop (by free service at university)  
Flip matras every month  
Put newspaper in wet shoes  
Remove dust from furniture  
Clean, dry and wrap tent after a holiday  
Clean sneaker every now and then to make them white again

## Appendix 5: Summaries participants diary study

### Activities:

- 1 x small care
- 2 x routine acts
- 3 x repairs
- 1 x preventive measure

### Characteristics participant:

- Has a lot of experience when it comes to Product care and all its types
- Familiar with the local Repair café
- Not afraid to try something when repairing/maintaining



### Motivation:

- Proper appearance products
- "It bothers me, I don't like the scratches and untidiness."
- "I really need the product"

### Barriers:

- Too big of a task, takes time and energy
- "I've done it recently. Don't feel like doing it any time soon."

Participant 'Frank' (92 years)

### Activities:

- 2 x repair
- 4 x routine acts
- 2 x preventive measure
- 1 x product revival

### Characteristics participant:

- Has a lot of experience when it comes to Product care and all its types
- Has many routines/returning activities



### Motivation:

- "I want to use product that are nice or new for a longer time."
- Negative experiences where products broke down
- Appearance (towards others)

### Barriers:

- "I tried multiple times." Does not know how to do it, previous attempts failed
- Has alternative products
- Postponing-behavior

Participant 'Eva' (55 years)

**Activities:**

- 2 x Product revival
- 1 x Preventive measures
- 2 x Repair
- 4 x Small care

**Motivation:**

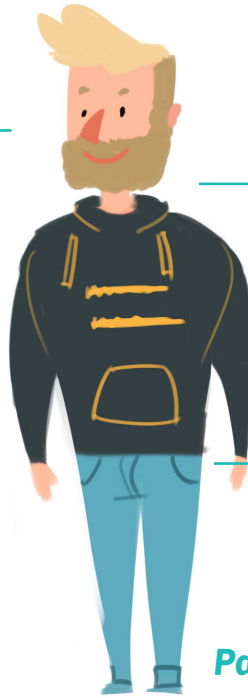
- Many products support his hobbies. Maintaining them enable those hobbies, or are part of the hobby.
- "I need them" (the functions of the products)

**Characteristics participant:**

- Postpones low-effort activities, until high-effort activities (such as repair) are necessary
- Has a lot of experience with repair and maintenance
- Can find pleasure in repair and maintenance

**Barriers:**

- Costs of maintenance
- Boring activities (especially small activities that can be postponed)

**Participant 'Jonathan'** (25 years)**Activities:**

- 4 x routine acts
- 1 x repair
- 2 x preventive measure
- 1 x small care
- 1x creating something

**Motivation:**

- Preventing things from breaking
- Appearance, making something look like new again is nice
- Motherly love

**Characteristics participant:**

- Mostly has routines which she performs often. Taught to her by her parents
- Enjoys it when everything looks tidy and nice again

**Barriers:**

- "I don't have the time." - A shortage of time

**Participant 'Dana'** (38 years)



Ap

**Activities:**

- 2 x mindful handling
- 1 x product revival
- 1 x small care
- 1 x preventive measure
- 1 x repair

**Motivation:**

- Proper appearance products
- Actively trying to prevent the products from breaking down

**Characteristics participant:**

- Mostly does low-effort activities frequently.
- Also sees Product care sometimes as enjoyable. (relaxing)

**Barriers:**

- "There's no rush."
- It is not urgent at the moment
- Insecurity about how to do it



**Participant 'Emma'** (25 years)

**Activities:**

- 2 x product revival
- 2 x creating something
- 1 x repair
- 2 x preventive measures
- 1 x routine acts
- 1 x mindful handling
- 1 x small care

**Motivation:**

- Wants to upkeep the quality
- Listens to advice of experts and environment
- Makes/does things out of motherly love

**Characteristics participant:**

- Wide range of product care activities and experience
- Hates to throw away products, repair is the solution

**Barriers:**

- Afraid to damage products (herself, or a repair service)



**Participant 'Jody'** (59 years)

## Appendix 6: Diary data (succeeded)

Deelnemer	Casenummer	Welk product?	Wat voor soort onderhoud?	Waarom besloot je dit te gaan doen?	Was je gemotiveerd om dit te doen?	Was er iets aan het product wat je tot actie zette?	Was er iets aan actie zette?
	1.1	Set theeglazen	Schoonmaken met schuursponsje	Thee geeft een licht bruine aanslag zonder het in de vaatwasser te gaan doen, het stoort na een paar keer gebruik. Het leek onfris	Ja, het leek onfris	Het leek onfris	nee
	1.2	Verzameling automodellen dinky toys	Stofvrij maken. Afborstelen	Ongeveer 3 x per jaar is het stoflaagje storend	Ja, het stond slordig	Het is een gewoonte. Ik stof +- 60 modellen af met een aquarellenseel nr 14	Op de glasplaat een zichtbaar open vitrine
	1.3	Drinkglazen	In een set drinkglazen, welke bij mijn vrouw in het verzorgingshuis stonden vormden zich lichte kalkringen op het glas waar 's nachts water stond	De glazen werden meestal geleegd zonder wassen en afdrogen. Ik vond de kalkafzetting onfris en wilde de glazen wassen, maar de ringen waren wat verhard.	Ja, het waren mooie glazen maar dit stoorde mij, ik wilde ze bij iemand in de vaatwasser doen of in water met een tablet weken.	Mijn huishoudelijke hulp stelde voor ze te weken in een sterke azijnoplossing . Twee dagen weken waren voldoende	Mijn hulp dus
	1.4	Een broek	De achternaad liet los, liet dat repareren bij 'Repair cafe'	De buurman zei dat ik zo niet op de fiets het dorp in kon	Zie hiervoor	Zie hiervoor	Ik ga mijn oude fiets showen
	1.5	Houten vloeren	Vilttoppen of plaatjes onder poten van stoelen en krukken geplakt	Sommige poten hebben iets scherp en maken krassen op de vloer	Ja, ik hou niet van krassen	Toen wij houten vloeren aanbrachten	Eerst was er een vloerbedekking
	1.6	Kastdeurtjes	Twee deurtjes (171 x 29,5 x 1,4 cm) vervangen	Ik struikelde over een pantoffel viel met mijn achterwerk tegen een deurtje, zocht steun en ramde het andere	In beide deurtjes zat een deuk en ze hingen uit de scharnieren	Zie hiervoor. Twee deurtjes op maat laten zagen en met bestaande pianoscharnieren weer aangebracht	nee
	1.7	Flymo 330 gazonmaaier	Startknop weigerde. Knop zit in bedieningshuisje midden op handvat. Bij indrukken, start de motor en dan nemen de handels het over	Startknop werkte niet en ik wist niet hoe deze werkte. Daarom ben ik naar het vrijwilligers Repair cafe gegaan, waar iemand de knop kon herstellen	Ja, mijn gras werd te lang	De machine weigerde te starten	Mijn normale maaiers maaien steeds in het gras
	2.1	De oplaadadapter van mijn laptop	De aansluiting van de adapter en kabel trek ik eruit als ik de oplader in mijn tas doe	Het knikpunt van de kabel is niet zo sterk meer dus ik wil voorkomen dat hij gekke hoeken maakt en nog slechter/kapot raakt	Ja, ik wil niet dat mijn lader kapot gaat	Vroeger deed ik dat nooit, maar nu wel omdat hij al wat gevoeliger is	
	2.2	Laptop	Laten uitblazen	Hij werd weer erg warm en dat is niet goed	Half, ik ga wat voorzichtiger om met mijn laptop ivm ouderdom van de laptop. Dus wil geen onnodige risico's nemen. Maar ik was nog nooit bij de ICT ervicecesk geweest van de TU en wist niet of ze dit wilden doen	Harder blazen (geluid alsof hij opstijgt)	
	2.3	Kleding	Niet wassen maar uithangen	Ik waste altijd kleding na 3 dagen gedragen te hebben. Maar daardoor sleten ze snel, ik doe nu de geurtest. Als het niet stinkt en er zitten geen vlekken op, dan hang ik het even uit. Vooral broeken en vesten	Ik ging de was doen en moet selecteren wat nodig is en wat niet		Ook was de was dus mede daaraan een selectie
	2.4	Telefoon	Hoesje van knop gehaald	Mijn telefoon was op fast boot gegaan (een soort fabrieksmenu) waarop ik niet uit kon komen. Dus ik wilde hem er uit proberen te krijgen dmv on/off knop maar door het hoesje voel ik deknop niet goed en ga ik heel hard drukken en dat maakt de knop stuk. Dus ik heb de hoes ervan af gehaald zodat ik beter de knop kan voelen en niet kapot druk	Bij mijn oude telefoon was de onoff knop ook al gevoelig geworden		Vandaag
	2.5	Mijn mi-fitbandje (soort van fitbit)	Met secondelijm de houder terug in het bandje geplakt	Het computertje viel er bijna uit omdat het houdertje los zat	Ja, omdat ik niet wilde dat het computertje eruit valt als ik het draag en dan kwijtraak		
	2.6	Oorbeltjes	Alle viezigheid er even afhalen en een beetje poetsen	Ik zag dat ze wat smoezig werden	Het is even lekker priegelen, geeft mij een rustig gevoel		
	3.1	Tondeuse	Ik heb hem goed schoongemaakt en een vloeistof gekocht zodat de draaiende onderdelen 'smoother' lopen	Omdat ik voor de zoveelste keer mijn baard niet kon trimmen en door dit boekje	Nee	Ja, hij deed het heel slecht. Na 2 uur opladen deed hij het pas	Ja, mijn gezicht een feest
	3.2	Schoenen	Preventief, extra zolen in doen zodat ik minder snel last krijg van zweetvoeten	Ik kreeg last van zweetvoeten	Ja, het irriteerde me	Ja, goedkope schoenen hebben slechtere zolen	Nee
	3.3	Mijn bar	Deel van d planken vervangen	De oude waren aan het rotten	Ja, het werd lekker weer en het was ook leuk om te doen	Ja, door het niet onderhouden in de winter gingen de planken rotten	Nee
	3.4	Bierbrouw producten/instrumenten	Schoonmaken	Dit moet, omdat er anders een grotere kans is op infectie in 't bier	Ja, ik wou een lekker biertje brouwen	Nee, de instrumenten zagen er al schoon uit, maar volgens mijn boekje moest ik 't toch nog extra schoonmaken	
	3.5	Gietijzeren pan schoonmaken	Zoveel mogelijk direct na gebruik schoonmaken	Omdat ik zuinig ben op die pan	Ja, omdat het een fijne pan is	Na koken is die vies	Nee
	3.6	Motorfiets	Stuur vervangen	Omdat mijn oude stuur krom staat	Ja, met het ouder stuur reed de motor vervelend	Ik viel en toen was het stuur krom	
	3.7	Auto	Koelvloeistof bijgevuld	Ik check altijd na 1000km een aantal dingen, omdat dat moet bij een oude	Ja ik vind dat wel leuk	Nee.	Nee

Anders wat je tot	Wanneer heb je dit gedaan?	Heb je dit eerder gedaan? Hoe vaak doe je dit?	Wist je hoe je dit moest doen?	Hoe zou het product je kunnen ondersteunen zodat je het vaker zou gaan doen?	Nog andere opmerkingen?
	Na enige malen met warm water afwassen	Ik doe dit geregeld na ongeveer 3 keer gebruik	Ervaring	Een vaatwasser aanschaffen	éénpersoonshuishouden
Watjes vormt zich laagje, het is een	3 x per jaar	Al 10 jaar of meer	Goed nadenken. De modellen zijn wel redelijk teer en de haren van het penseel moeten zacht zijn		
	Een maand geleden	Nee	Nee	Ik zal het nu wellicht vaker meer toepassen	
terbroek niet op de	Plusminus drie maanden geleden	Nee	Ik had mijn naaimachine aan een vrijwilligersorganisatie gegeven en die hebben het uitgevoerd	Ik kan anderen op deze organisatie wijzen	
en andere ng, vilttapijt	30 jaar geleden	30 jaar dus. Soms gaan doppen los of slijten door. Sommigen kunnen jaren mee	Uit gebruiksaanwijzing	Ik wil het liever minder vaak doen en daarom lijm ik vaak extra bisonkit omdat de aangeleverde kleeflaag minder hechtend is	
	Rond Sinterklaas 2017	Jawel, een enkele keer	Ja, ik ben bouwkundig en maak vaker kastjes	Ik kijk uit om niet te struikelen dan hoef ik het niet vaker te doen	
grasmaaier een angbak verstopte lange vrij vochtige	week 40 dit jaar		ik steun het repair cafe		
	Elke keer als ik hem in mijn tas doe	zie hiervoor		lets van een klein symbooltje wat de suggestie geeft dat het beter is om hem eruit te halen. Een duidelijk stuk om kabel eruit te trekken	
	Voordat ik echt zware programma's moest gaan gebruiken zoals illustrator en indesign voor afstuderen	Ja, ongeveer x per 2 jaar maar het zou vaker kunnen		Melding geven als het te warm wordt of eens per x tijd een melding geven	Vroeger zette ik hem altijd op mijn bed. Dan vangt hij veel stof. Sinds de eerste keer dat ik hem heb laten uitblazen ben ik me er wel bewuster van waar ik hem beter wel en niet neer kan/moet zetten
grasmand al erg vol, rdoor maak ik ook	Vandaag, ik was ongeveer 1x per week		Ooit heb ik gehoord dat wassen helemaal niet zo goed is voor e kleding. Sindsdien doe ik jeans en vesten minder vaak in de wasmachine omdat die snel verkleuren of minder zacht worden	Een graadmeter met wanneer het acceptabel is het te wassen.	Ik doe altijd de haakjes van mijn bh's dicht zodat die nergens achterblijven hangen en dus niets kapot kunnen maken, zoals panty's
	Nog niet, maar zou het de volgende keer weer doen	Leek me een goede manier om te zorgen dat ik niet gelijk de telefoon verpest, heb hem nog maar 4 maanden			
	Tijdje terug	Nee, maar ik denk wel dat ik het soms nog wel een keertje zal moeten doen  Eens in de zoveel tijd als ik eraan denk en het nodig is	Nee, maar secondelijm leek me de beste oplossing om het te proberen te fixen		Het komt doordat ik veel te vaak met het bandje speelde waardoor het los is geraakt
nt scheren voor		9-okt Ja, toen ik dat vloeistof had. Altijd na afloop van trimmen. Toen de vloeistof op was niet meer	Ja, ervaring en 1e keer door instructie boekjes	Grote pot van die vloeistof	t Onderhoudschema van product was duidelijk. Zodra m'n potje vloeistof op was deed ik niks meer
	Bij aankoop van schoenen	Ja, bij elke nieuwe schoen	Ja, ervaring plus het is ook heel makkelijk	Weet ik niet	
	Vlak voor de zomer	Nee, 1e keer onderhoud na het bouwe	Ja, ik had de bar zelf gebouwd dus ik wist hoe deze in elkaar zat	Weet ik niet	
	Na koken en eten	Ja 1x per 2 weken	Ja, veel doen	Minder zwaar zijn/gebruiksvriendlijker. Dan zou ik de pan ook vaker gebruiken	Het schoonmaken is niet zo leuk, ik zou hem vaker willen gebruiken
	Afgelopen weekend	Nee, 1e keer onderhoud na het bouwe	Ja, onderhoudsboekje lezen. Was wel lastig	Ik zou het liever niet vaker doen	
	1 maand geleden	Ja 2 keer	Ja, m'n vader heeft het uitgelegd	Is niet nodig	

3.5	Gietijzers pan schoonmaken	Zoveel mogelijk direct na gebruik schoonmaken	Omdat ik zuinig ben op die pan	Ja, omdat het een fijne pan is	Zelfs als mijn eigen mijn boekje moest ik 't toch nog extra schoonmaken	Nee
3.6	Motorfiets	Stuur vervangen	Omdat mijn oude stuur krom staat	Ja, met het ouder stuur reed de motor vervelend	Ik viel en toen was het stuur krom	Nee
3.7	Auto	Koelvloeistof bijgevuld	Ik check altijd na 1000km een aantal dingen, omdat dat moet bij een oude auto	Ja ik vind dat wel leuk	Nee.	Nee
3.8	Planten	Water geven	Omdat ik dat relaxed vind en het moet ook	Ja, ik vind dat leuk	Nee	nee
3.9	Laptop	Iemand heeft voor mij de ventilator schoon gemaakt	Hij werd heet en maakte veel herrie	Nee	Ja, hij werd heet en maakte veel herrie	Ik moest afstudee dus ik wou hem
4.1	Fleecetrui	zoom gestikt	De zoom was los. De trui is van mijn vader.	Leek slordig. Sluitkoord hing los. Vader kan het zelf niet goed zien.	Was disfunctioneel, door bungelend koord.	Het weer wordt Trui is weer nood
4.2	Hanglamp boven eettafel	Doorgebrand kroonsteente vervangen. Laten vervangen door zoon van een kennis	Lamp deed het niet	Ik had staande lamp geleend. Ik wilde lamp zelf repareren, maar durfde niet goed. Maar door korte dagen was het nu nodig	Geen licht, waardoor eettafel slecht licht had	In de winterma we vaak menen ik me toch een
4.3	Wasdroger	Filter schoongemaakt	Eerste filter maakte ik voor elk gebruik schoon. Leek me verstandig en tijd voor grondiger werk. Vanwege veiligheid	Is routine. Er knipperde een onbekende code, veiligheidshalve toen extra schoongemaakt		Display toonde geen zin de geb raadplegen
4.4	Pannen met tefal laag	Preventief leg ik doeken tussen de pannen om beschadigen te voorkomen in de la	Ik wil deze pannen lang en veel gebruiken. Ze zijn fijn in gebruik	Kost geen moeite en pannen nemen door stapelen minder ruimte nodig	Je weet dat je in tefal pannen geen metaal mag gebruiken, dus voorzichtig zijn met stapelen is heel logisch	Ik wil voorkomen anders de pann doekjes stapelt. mooie deksels
4.5	Staaftmixer	Na gebruik direct schoonmaken en opbergen	Ter voorkoming dat de mixer moeilijk schoon te krijgen is en onbruikbaar word	Ik vind het zonde om om zo'n knullige reden iets kwijt te raken		In het verleden onnodig hierdoe weggoeien
4.6	Rits van leren jas	Rist met druppeltje olie gesmeerd	Heb nieuwe rits laten plaatsen en wil die nu langer goedgehouden	Doordat de vorige rits vast liep en kapot ging		Was zomer- en aan het wissele Verlengen leveren
4.7	Sportkleding + schoenen	Na sporten direct uit de tas gehaald om te wassen/drogen	Ter voorkoming van stinken + schimmelvorming (het weer)	Ja. Vast ritueel direct bij wasmachine kleding droppen en tas klaarzetten voor volgende keer		
4.8	Buitenkussens	Opstapelen + droog leggen	Voorkomen dat ze nat worden	Ze zijn nieuw, ik wil ze mooi houden	De lichte kleur laat snel vlekken zien	Ik wil graag dat blijven
5.1	Bestaande bureaustoelen opnieuw bekleden.	Nieuw leven inblazen, uitstraling naar boven halen; vervangen van bekleding van 2 stuks stalen buisstoelen	Het weigeren van 'verzoek' dochter, om bestaande jaren 70 bekleding schoon te maken; leek mij heilloze weg	Jazeker/ Mooie aanleiding om gekoesterd verlangen dit eens te doen, te vervullen & zekerheid van tevreden dochter & persoonlijke afkeer van bestaande uitstraling (vieze, vlekkerige maar kwalitatief goede oranje-bruine ribcord bekledingsstof) & persoonlijke voorkeur voor stalen buisstoelen & tijd. Kortom het ervoor over hebben, in vele opzichten.	Vieze bekledingsstof; vermoeden dat vlekken er nooit echt uit te verwijderen zouden zijn. En kwaliteit van totaalproduct. En mogelijke demontage rugleuning én zitting.	Moederliefde & nietpistool bij e winkel aan te so
5.2	Staan fotolijstje (omgekeerd ophangen)	Andere toepassing dan die door ontwerpers bedacht.	Overweging om niet nog meer spullen op een bepaald werkblad te willen plaatsen	Ja / "opgeruimd staat netjes"; mogelijkheden van LUNDIA kast nóg verder uitbreiden.	Ja. De vorm	Nee
5.3	Toiletbril en-deksel op z'n plaats houden.	Reparatie; bevestigings-/verstel-onderdelen (kunststof moeren en bouten) aandraaien.	Terugkomende irritatie van een verschuivende toiletbril	Niet echt; noodzakelijk gegeven	De mogelijkheid tot	Zie hiervoor
5.4	Toevoeging om hoesje van Windowsphone; voorkomen dat pasjes eruit vallen.	Een soort van 'Nieuw leven in blazen'. Een 'post-elastiek' (dik elastiek) zodanig toevoegen dat pasjes erin blijven zitten; ook als ik het product (met inhoud) op z'n kop houd.	Omdat de pinpassen, rijbewijs e.a. steeds vaker uit de 'insteekhoesjes' in de binnenzijde van het beschermingsflapje, dreigen te vallen.	Ja / "zonde om nieuwe te kopen" en het leuk vinden om zelf te 'prutsen' en om 'praktisch te pimpen'	Niet echt. De hoekig, stijve vorm, maakt het wel mogelijk.	Zie hiervoor. Je pinpassen en rij kwijt raken.
5.5	Plastic fles vruchtendrank hergebruiken.	Nieuw leven inblazen. Een leeggeschon kunststof 'jerry-can-achtige verpakking ontdoen van etiketten, wordt een neutraal watertappunt voor in de pauze van een hockeywedstrijd.	Hergebruik, handige vorm (met handvat, door meer dan één speler te gebruiken, mogelijkheid om heel eenvoudig etiket te verwijderen, makkelijk om te spoelen, sterk genoeg, vervangbaar, 'low-cost', principe.	Ja, zeer / Eenvoud en zie hiervoor en voorbeeld in opvoeding.	Vorm. En makkelijk verwijderbaar etiket.	Zie hiervoor
5.6	toevoegen kunststof snijvlak/-plank, zelfs bij doorsnijden van één Citroen.	Preventieve maatregel (Kleine zorg) om te voorkomen dat hardstenen aanrechtblad door zuur wordt aangetast.	Om lange levensduur van (aanzicht van het) blad te waarborgen.	Ja / Door hoge aanschafprijs en plaatsvastheid (lastige vervangbaarheid) van geheel om maat vervaardigd aanrechtblad.	De hoge kwaliteit. En de vervulling van jarenlange wens dit materiaal toe te passen in ons eigen ontwerp.	alles al gezegd
5.7	Onderhoud wok(pan)	Routine; eerst spoelen, daarna etensresten laten losweken, dan spoelen en vervolgens met keukenpapier droog maken	om kwaliteit van wok te garanderen	idem	Kwaliteit, uitdaging om onderhoud optimaal uit te voeren	Partner; hij weet hoe een wok te
5.8	(vloeibaar) wasmiddel DIRECT IN de wastrommel doen voorafgaand aan wasprogramma.	Voorzichtig gebruik spullen. Het voorkomen dat wasmiddel-restanten zich ophoopt in toevor vanaf daarvoor bestemd bakje in frontpaneel naar de wastrommel.	Op aanraden van de monteurs, bij aflevering van deze nieuwe wasmachine	Ja / Met beeld van vuiligheid van vorige machines op het netvlies. En de 'geen-speld-tussen-te-krijgen' redenering van deze monteurs ".. wasmiddel toevoegen op de plaats waar je het wil ..".	(De nieuweheid van dit relatief dure product, zo lang mogelijk willen blijven vasthouden). Dus antwoord is "Nee".	Zie hiervoor

	Na koken en eten	Ja 1x per 2 weken	Ja, veel doen	Minder zwaar zijn/gebruiksvriendelijker. Dan zou ik de pan ook vaker gebruiken	Het schoonmaken is niet zo leuk, ik zou hem vaker willen gebruiken
	Afgelopen weekend	Nee, 1e keer onderhoud na het bouwen	Ja, onderhoudsboekje lezen. Was wel lastig	Ik zou het liever niet vaker doen	
	1 maand geleden	Ja 2 keer	Ja, m'n vader heeft het uitgelegd	Is niet nodig	
	In het weekend	Ja 1 x per week	Ja, uitleg gekregen van mijn vriendin	Niet nodig	Ik wil een gieter. Dan haal ik er nog meer lol uit
eren op deze pc goed hebben	2 maanden geleden	Nee.	Nee, ik heb hem aan een maat gegeven die dit kon	Makkelijker voor mij om de laptop te kunnen demonteren	
weer kouder. lig.	Vandaag. 14 oktober	Ja bij andere trui/broek, maar geen hele zoom. Bovendien met de hand gedaan ipv met de naaimachine	Ervaring	Door betere zoomafwerking bij het maken zou het niet nodig zijn	
anden hebben te eten, schaam oetje	Vorige week	Ja. Bij andere lampen, 1x bij deze en toen kreeg ik een elektrische schok	Wist hoe het moest. Ervaring. Durfde niet, deze jongen had eerder geholpen	Eenvoudiger toegang tot plafond balk waarin ik parallel schakeling had gemaakt. Dit vraagde 2 personen	
een code, ik had ruiksaanwijzig te	12-okt	Dit filter voor het eerst schoongemaakt. Ik verwacht 4x per jaar	Nee, maar er zat een instructiesticker op	Ipv code een symbool gebruiken om me te wijzen op noodzaak tot schoonmaken	Code en geluidssignaal zijn irritant, bieden onvoldoende info en maken het 'agressief'
on dat iemand en zonder Pannen hebben dunder	Bijna alle dagen	Ik ben met deze pannen voorzigtiger dan met voorgangers	Ervaring + gebruiksaanwijzing	Op handvat of in de pan een leuk symbool/smiley dat je eraan herinnert	Als meerdere pannen als nest in elkaar passen en vormgeving krasen onmogelijk maakt
wel apparaten or moeten	Vorige week	Na elk gebruik	Vaak gedaan	Deze staafmixer is gemakkelijk schoon te maken, maar soms zijn apparaten dat niet. Meer demontabele delen en vloeïende vormen	
winterkleding n	Vorige week	Nee	Niet precies. Heb mijn moeder het zien doen vroeger	Wellicht kan de kleur van de rits in de loop der tijd veranderen als indicatie	
dsduur sportspul	Vrijdag	Elke week 2x	Algemene kennis		
ze lang netjes heb	Elke dag sinds ik ze in juli gekocht heb	zie hiervoor			
smoes om een doe-het-zelf haffen	In tijdbestek van 5 weken; steeds een fase. Aug-sep 2018.	Nee	Ja, Logisch nadenken, handwerklessen in 60-er jaren, en ervaring met tapijttegels aan elkaar vastzetten m.b.v. 'kromme naald'.	Basiskwaliteit garandeert zowat een 'live-long-resistance'.	Hele actie vooral ingegeven door 'gun-factor' en 'zin om dit eens te doen', voorbeeld hoe je dit kan aanpakken.
	Jaren geleden	Nee, zou daarvoor nog eenzelfde product moeten hebben.	Nee, zelf bedacht.	Wellicht iets andere buiging van kunststof realiseren.	
	3 weken geleden voor het laatst	Het is een permanente herhaal sessie	Ja / Ervaring en weten hoe dit product is samengesteld en dat dit de mogelijkheid is.	Het product zou beter een wijziging in vorm van de bevestigings-/verstel-onderdelen kunnen hebben, dat dit MINDER VAAK zou moeten gebeuren	Iedere keer rijst de vraag: zouden deze 'vleugel' moeren niet een iets beter vorm kunnen krijgen i.r.t. vorm van keramische toiletpot ?
wilt liever je bewijs niet	Vanochtend nog	Ik vervang het elastiek wel vaker, door een nóg betere; lengte, dikte en nieuwigheid doen er toe. In relatie tot de vorm van hoesje.	Ja eigen idee	nvt	Ik heb het hoesje uiteraard structureel veel te vol gepropt met passen, bonnetjes en meer. Is gaan scheuren, 'klemt' daardoor onvoldoende meer.
	2 weken geleden	Ja / om de paar weken. (oude flessen > plastic-afval-bak !!)	nvt	Onder het vruchtensap-etiket een 'reminder' in de vorm van een opdruk "H2O voor het hele team" erop o.i.d.	Dit valt misschien een beetje buiten de bedoeling, maar toch werkt het voor mij/ons wel als bedoeld in dit onderzoek; we pimpen 'af', i.p.v. 'op'.
	vandaag nog	Ja / Vanaf de oplevering van de keuken, nu (ongeveer) 8 jaar geleden; altijd, consequent.	Ja / Op uitdrukkelijk advies van SieMatic keukenleverancier, via wie ook aanrechtblad is geleverd en gemonteerd.		
rt van huis uit, onderhouden	Gisteren (inclusief eergisteren inweten).	Ja / Altijd na ieder gebruik ongeveer één of vaker/week.	Nee, zelf verzonnen, vanwege het advies van partner om NIET met zeepsop vet op te lossen, maar altijd een soort van vet in de pan te laten trekken.	Misschien gebruiksaanwijzing (heb ik nooit onder ogen gehad; bij Chinese Amsterdamse winkel aangeschaft).	Als ik (een) Indonesische ouder(s) zou hebben, zou de wijze waarop, ongetwijfeld door mij gekopieerd zijn.
	gisteren nog	Ja / Altijd; doseerbakje werkelijk NOG NOOIT gebruikt !	Ja / Uiteraard (dit is te simpel voor woorden): doseerdop vullen met wasmiddel en bij de was doen in de trommel. De monteurs adviseerden eerst de was en daarna het wasmiddel, om spreiding/oplossing zo optimaal mogelijk te laten plaatvinden (dat wasmiddel niet direct bij eerste spoeling wordt afgevoerd).	Ander ontwerp; geen doseerbakjes aanbrengen, of keuze, dat bij vloeibaar dit de voorkeur heeft ??	'pods' het zou toch simpeler kunnen; ZELF doseren ??! & geen plastic extra toevoegen ??



	oorsnijden van een citroen.	voorkomen dat narastenen aanrechtblad door zuur wordt aangetast.		vervangaarneid) van geneei op maat vervaardigd aanrechtblad.	dit materiaal toe te passen in ons eigen ontwerp.	
5.7	Onderhoud wok(pan)	Routine; eerst spoelen, daarna etensresten laten losweken, dan spoelen en vervolgens met keukenpapier droog maken	om kwaliteit van wok te garanderen	idem	Kwaliteit, uitdaging om onderhoud optimaal uit te voeren	Partner; hij hoe een wok
5.8	(vloeibaar) wasmiddel DIRECT IN de wastrommel doen voorafgaand aan wasprogramma.	Voorzichtig gebruik spullen. Het voorkomen dat wasmiddel-restanten zich ophoopt in toevoer vanaf daarvoor bestemd bakje in frontpaneel naar de wastrommel.	Op aanraden van de monteurs, bij aflevering van deze nieuwe wasmachine	Ja / Met beeld van vuiligheid van vorige machines op het netvlies. En de 'geen-speld-tussen-te-krijgen' redenering van deze monteurs "... wasmiddel toevoegen op de plaats waar je het wil ...".	(De nieuwigheid van dit relatief dure product, zo lang mogelijk willen blijven vasthouden). Dus antwoord is "Nee".	Zie hiervoor
5.9	Rits in vest maakt jas voor op de fiets.	Het creëren van iets anders. Wintervest wordt voorjaars- /najaars-jas; geschikt voor op de fiets.	Vanwege de irritatie die dit kledingstuk opleverde bij het dragen op de fiets; waalde open. Terwijl andere jas veel te warm was. En verder 'zat 'ie zo lekker'.	Ja, ik zag de mogelijkheid	De pasvorm en het model boden de mogelijkheid om rits 'uit het zicht te houden' bij DICHT. En geen bezwaar te zien bij in het zicht bij OPEN.	Moederliefde
5.10	Onderhoud SieMatic keuken-fronten en -panelen	Voorzichtig/bewust gebruik. Schoonmaken ALLEEN MAAR met groene zeep.	Vanwege hoge kwaliteit van nieuwe keuken. Eindelijk vervulde wens van eigen ontwerp in hoge kwaliteit	ja, zie hiervoor	Uitstraling. Chique ingehouden matheid van toplaag. Eenheid van totaal willen bewaren.	Duurzaamheid, zuinigheid, a zeer goede a
6.1	Vaatwasser	Vaatwasser schoonmaken. Roosters en sproeiarmen poetsen	Dan werkt de machine beter en gaat die langer mee	Nee	Hij was vol bij de vieze lading, eerst schoonmaken	
6.2	Kleding	Naaien, gat maken	Lievalingsbroek	Ja, broek zit lekker en naaien vind ik leuk	Er zat een gat in, vastnaaien op de naaimachine	Werd gewez legging
6.3	Auto	Naar garage gebracht	Foutmelding	Ja		
6.4	Fietsband	Naar fietsmaker gebracht	Anders gaat het wiel kapot	Ja, dan kan Doutzen (dochter) weer fietsen		
6.5	Afwassen	Pan met sop wassen	Deze was vies	ja	Pannen waren vies	
6.6	Deur	De deur aan de muur gehangen voor knutselwerken	Ziet er leuk uit	Ja	De deur stond bij het grofvuil. Had een mooie kleur, leuk idee om knutsels op te hangen	
6.7	Kleding	kleding in de wasmachine	ze waren vies	Ja hoor, de wasmachine wast		
6.8	Telefoonhoes	Hoes kopen voor telefoon	Omdat ik graag dingen laat vallen. En zodat tijdens het reizen de Ipad beschermd blijft	Ja, ik houd mijn spullen graag netjes		
6.9	Zilver	zilverpoets	Dan glimt het weer	Ja, weer netjes	Het werd dof (zwart)	

		altijd, consequent.	wie ook aanrechtblad is geleverd en gemonteerd.	
veet van huis uit, te onderhouden	Gisteren.(inclusief eergisteren inweken).	Ja / Altijd na ieder gebruik ongeveer één of vaker/week.	Nee, zelf verzonnen, vanwege het advies van partner om NIET met zeepsop vet op te lossen, maar altijd een soort van vet in de pan te laten trekken.	Misschien gebruiksaanwijzing (heb ik nooit onder ogen gehad; bij Chinese Amsterdamse winkel aangeschaft).
	gisteren nog	Ja / Altijd; doseerbakje werkelijk NOG NOOIT gebruikt !	Ja / Uiteraard (dit is te simpel voor woorden): doseerdop vullen met wasmiddel en bij de was doen in de trommel. De monteurs adviseerden eerst de was en daarna het wasmiddel, om spreiding/oplossing zo optimaal mogelijk te laten plaatvinden (dat wasmiddel niet direct bij eerste spoeling wordt afgevoerd).	Ander ontwerp; geen doseerbakjes aanbrengen, of keuze, dat bij vloeibaar dit de voorkeur heeft ??
e	een jaar geleden	Nee, niet echt. Het hoorde oorspronkelijk bij de 'niet gelukt'-projecten. Ik heb het bij Turkse kleermaker LATEN DOEN.	Ja, de reden om het uiteindelijk uit te besteden. Geen naaimachine in directe omgeving voorhanden	'pods' het zou toch simpeler kunnen; ZELF doseren ??! & geen plastic extra toevoegen ??
id. Trots, adviezen van verder adviseurs volgen.	aantal dagen geleden	ja, vanaf begin. Ongeveer 8 jaar geleden	ja, levenservaring	
	Elke keer wanneer de vaatwasser gevuld wordt	Ja, 6 a 7 x per week	Ja, staat als advies in de gebruiksaanwijzing	Vuilindicator aangeven
en op gat in mijn	Vrijdagmiddag	Ja, bij andere kledingstukken	Ja, ervaring	
		Ja, 1x per jaar apk keuring Ja, 1 x per jaar	Ja	
	3 jaar terug	Ja elke dag nee	Ja geleerd nee	
	Elke week een paar x Als ik een nieuwe telefoon aanschaf, Ja 3x bij een nieuwe telefoon deze gelijk erbij kopen			
	zomer	Ja 1 x per jaar	Ja van mem (moeder) geleerd	

## Appendix 7: Diary data (unsuccessful)

Deelnemer	Casenummer	Welk product?	Wat voor onderhoud zou je willen doen?	Waarom heb je dit (nog) niet gedaan?	Was je gemotiveerd om dit te gaan doen? Zo nee, waarom niet?	Is er iets aan het product waardoor je de moeite hebt om er wat aan te doen?
	1.8	Grasmaaier Wolff Garden A370E	Iets minder snel laten vastlopen in iets langer gras	Dan zou ik het apparaat moeten ombouwen	Daar zie ik de kans niet toe	De doorvoer van gemaaid gras naar de opvang is te nauw
	1.9	Formica blad van zelfgemaakt bureautje krult op	Het bureau gemaakt rond 1967 heeft een gelijmd formica blad dat los laat	Ik heb het 5 jaar geleden nog gedaan	Ja, want het gaapte wat aan de rand	Zie hiervoor
	2.7	Zijkzak netje van rugzak	Het gat dichtend zodat het niet verder uitscheurt voordat het te laat is	Ik moet er even voor zitten maar doe dat niet	Het is nog niet noodzakelijk. Waterflesjes blijven er wel nog goed in en vallen er niet doorheen	
	2.8	Verven van mijn eigen gemaakt jumpsuit		Ik wist niet of de stof kledingverf zal pakken en weet niet welke kleur het beste zal zijn		de kleuren zijn nu erg fel en ik wil dat demperverf en zorgen dat alles meer in dezelfde kleur valt
	3.10	Rugby bitje	Goed opbergen, ik raak hem vaak kwijt	Omdat ik vergeet dat hij in m'n broek zit. Ik raak hem kwijt	Nee, ik ben met m'n gedachten er niet mee bezig	Ja, het wordt wel duur om telkens nieuwe te kopen
	3.11	Rugby schoenen	schoonmaken	Omdat het saai is	Nee, ik doe liever iets anders	Ja, ze gaan namelijk sneller stuk
	3.12	Gitaarsnaren	Vervangen, ze zijn verroest	Omdat de gitaarwinkel verfietsen is	Ja	Ja, de gitaar speelt minder lekker
	3.13	Fietsketting	Spannen en invetten	Gereedschap is boven, maarfiets is beneden. Ik woon in een flat	Nee, 't sjuouwen van gereedschap kost meer tijd dan het spannen zelf	Ja, ketting schiet er wel eens af
	3.14	Piano	Toetsen schoonmaken	Geen zin in	Nee, ik vind schoonmaken niet zo leuk	Ja, hij is heel stoffig. Hierdoor speel ik er niet graag op
	4.9	Vaatwasser	Vaatwasser lekt	Heb rubber vervangen. Hielp niet. Klusjesman kan niets vinden. Ik weet niet hoe ik een oplossing kan vinden	Ja, want keukenkastjes zwellen op	Kan niet gebruikt worden, keuken ziet er dus slecht uit. Dat stoort me
	4.10	BH	Beugel van BH steekt door stof, dichtnaaien	Heb genoeg alternatieve bh's	Weinig vertrouwen dat het helpt	Is fijn basic product, zit lekker. Was bovendien goedkoop.
	4.11	Mijn Think pumps	Hakken laten repareren	Uitstel gedrag. Ik zie het steeds als ik ze weer draag en zet ze na gebruik opzij. En vergeet het	Wel de wens, want het zijn superfijne schoenen die ik al lang heb	Zien er lelijk en niet verzorgd uit. Staat sloof
	5.11	2 Stuks elektrisch peper en zoutstel werken beide niet meer; ook niet meer mechanisch te gebruiken.	Repareren. Het kan door een service gedaan worden. Waarschijnlijk is het contact tussen de bedienknop en het elektrische systeem mechanisch kapot.	Kan niet meer een goedkope buurt-reparatie firma vinden; vorige is gestopt. Ik kom er niet toe goed voor te bereiden, om zo'n service elders in de stad te vinden. Belangrijk, Het zelf doen lijkt mij niet mogelijk. Ik ben huiverig voor schade en ik heb het essentiële gereedschap niet voorhanden. Opsturen naar een leverancier of fabrikant lijkt me veel te duur.	jazeker, zie hiervoor	Een cadeau. Leuke (bijna guilty-pleasure-) gift voor in onze nieuwe keuken. Oogstrelend en duurzaam. En: superhandig in gebruik. Een mogelijkheid om verse peperkorrels en zee heel gemakkelijk bij de hand te hebben. We gaan enkele aanleiding om deze producten gooien. Alleen reparatie als optie.
	5.12	Losgelaten folie op keuken panelen en -deuren	Routine wijzigen. En tegelijkertijd: Nieuw leven inblazen	(Verkeerde routine laten "insluipen". Te lang gedacht dat stoom uit vaatmachine moest ontsnappen en daar van uit na iedere wasbeurt de deur op een kier gezet. Als debutant vaatmachine-bezitter nooit juiste routine aangeleerd gekregen/anderszins vernomen). Deze stoom heeft als het ware de lijmlaag tussen folie en gekleurde toplaag van deur losgeweekt.	Dat wel Ja [zie tevredenheid van nieuwe keuken in "G E L U K T"] . Maar weet geen goede oplossing	Ja / de uiterlijke verschijningsvorm verbeterd is nu een dissonant in een heel mooi geheel
	5.13	bescherm'dop' o.i.d. om scherpe punt van snoeischaar niet in tas te laten prikken (op weg naar moestuin).	Preventieve maatregel. Bescherming van tas waarin ik deze snoeischaar vervoer.	Alternatief gevonden (puntzijde in tuinhandschoenen).	2 <sup>e</sup> juiste antwoord: Folie herstellen.	Beetje; niet echt eigenlijk. Het alternatief was beter
	5.14	Bekleden van fauteuil	Het creëren van iets nieuws bestaand product aanpassen. De skai-zitting-bekleding van mijn tweedehands "Oyster", Pierre Paulin (Artifort / 1960-1999), is zodanig vergaan, dat gebruik niet meer mogelijk is. De fauteuil (gedeelte) bekleden. Eigenlijk alleen maar mogelijk door gespecialiseerd bedrijf.		Te kostbaar. Kwalitatieve en deskundige aanpak is ja eigenlijk de enige optie.	
	5.15	Tapijt op maat snijden.	Nieuw leven inblazen. ??? (een soort van). Juiste uitsnede/contravorm afronden van tapijt t.p.v. doorvoer CV-radiator.	laksheid	ja zeer	het ziet er niet 100% verzorgd uit. Interieur afgemaakt, andere dingen aan je hoofd.
	6.10	Kozijnen/deuren	schilderen	geen tijd		

eiging	Was er iets anders waardoor je de neiging hebt er iets aan te doen?	Heb je deze activiteit eerder wel eens gedaan? Hoe vaak doe je dit?	Weet je hoe je dit moet doen?	Hoe zou het product je kunnen helpen zodat je het wel zou gaan doen of het je wel zou lukken?	Nog andere opmerkingen?
angbank	nee	Ik maai om de 2 weken	ervaring van jaren	een ruimere doorvoer gras naar opvangbak	
		Ik heb het rond 2000 ook eens gelijmd met bisonkit maar nu laat het snel weer los en krult de formica plaat sterk	Ervaring	Ik denk dat het plastic verouderd is en ik het moet vervangen	
	In principe hoeft het niet moeilijk te zijn of lang te duren	Zoiets maar dan met sokken, sokken stoppen	Heb wel eens met sokken gedaan en het is 'gewoon' wat draadjes er tussen zetten	Zelfde soort material meegeven om het mee te stoppen	
en met eurtoon		wel een hippie tye dye maar niet voor kleding dat ik echt wil dragen en dat het er goed uitziet	Niet echt. Process van kleding verven ken ik wel maar niet precies hoe lang iets moet inwerken om de juiste kleur te krijgen. En welke verf de juiste kleur geeft	Voor (lichtgekleurde) kledingstukken mogen mensen bij aankoop ook al een flesje verf meenemen zodat ze wanneer erop uitgekeken zijn, of het vies is, direct kunnen verven. 1 label met verftips of kleurenschema	(zie tekeningetje)
ie kopen	Nee	Ja, ik koop elke maand een nieuw bitje	Ja, na gebruik weer in het bakje leggen	Weet ik niet, ligt meer aan mij dan het product	
	Nee	Ja, toen ik bij m'n ouders woonde	Ja, geleerd van m'n moeder	Misschien als ze nog sneller stuk gaan. Nu vind ik het nog betaalbaar, maar als 't elke maand moet zou ik ze beter onderhouden	
	Ja, ze kunnen nu ook snel knappen	Ja, 1x per jaar	Ja, geleerd van vrienden en youtube	Goedkoper en winkel dichterbij	Ik begin mezelf wel gierig te vinden :p
	fiets maakt een irritant geluid	Ja 1 keer per jaar	Ja zelf uitgeprobeerd	Dat ik m'n gereedschap beneden kwijt kan	
et op	Nee	1x per 2 maanden	Niet echt, ik gooi er een nat doekje over en 't verdwijnt	weet ik niet.	
ardoor	Er staat steeds vaat op de afwas. Ik mis het comfort	1x	Eerdere pogingen mbv Youtube is niet gelukt	Kan het apparaat niet middels het display aangeven wat er mis is of welk onderhoud er nodig is	
ien niet	Is pijnlijk om te dragen, prikt in de huid.	In verleden bij andere bh's ging het al vrij snel weer kapot	Ik denk van wel, maar blijkbaar toch niet goed genoeg	Ik gebruik wasnet in wasmachine. Maar wellicht een advies om dit te voorkomen	
dig	Fijne, maar ook dure schoenen	Wel, maar te weinig	Schoenmakersservice in eigen dorp heb ik nog nooit gebruikt	Service bieden via internet de schoenen te laten halen/bezorgen	
adgets en	zie hiervoor	nee	denk het te weten	Onderde(e)l(en) toegankelijk maken. Of toevoeging in gebruiksaanwijzing (die ik helaas niet meer heb/ niet op internet kan vinden).	
zout, erkelijk weg te					
ren; het l.	alles al gezegd	nee	nee, zie hiervoor. Maar de routine; na uitzetten vaatwasmachine de klep te sluiten, heb ik mij inmiddels WEL aangeleerd !	Product zelf niet. Advies bij levering van deze kwalitatieve (design-) keukens is -hieroever- niet verstrekt.	'stom' blijft mijn mantra in deze.
oldoet.	zie hiervoor, scherp punt (ook in gesloten stand)	Ooit, toen ik de snoeischaar in de keukenlade bewaarde. Bescherming tegen lade.	nvt	Ik denk het: zoeken in doe-het-zelf-zaak om een rubberen of kunststof bescherm-element te zoeken.	ja, het erbij leveren
	De fauteuil heb ik al zo'n 45 jaar in bezit. Emotionele waarde (het product bestaat slechts 1 jaar korter dan dat ik leef). En mijn persoonlijke voorkeur (ik ben een echte fan van sixties-design), zorgen dat ik hem niet wil afdanken. In de huidige staat niet bruikbaar. En de fauteuil oogt beetje 'viezig', doordat vulling uit gescheurde naden komt.	zie hiervoor	Nee nog nooit een 'vorm met binnenkromme-bekleding' en/of skai met op maat gemaakte foam-achtige vullingerepareerd.	nee	n.v.t. (de vorige eigenaar had dit product nooit buiten bij de vuilnis moeten zetten; misschien heeft regenwater ooit het proces verergerd, maar dat weet ik niet meer).
net niet	klein beetje schuldgevoel, het was (en blijft) 'mijn klusje'	Ja, meerdere malen in mijn leven. Voor mijzelf en anderen.	Ja /Eervaring en een beetje durf.	Een aantal malen bijleveren vanuit tapijt-/stofferings-bedrijf ??	- (schiet mij niet te binnen, omdat ik het al zo vaak enigszins op gevoel, doe.
	Ja 1 x tijdens het plaatsen van de nieuwe ramen	Ja geleerd van heit (vader)			

### Pre-session

#### *Arrange beforehand*

- Setting a date (31 October)
- Asking participants, getting at least 4. Max 6.
- Booking a room (C-1-020)
- Getting materials: so many post-its, flipover sheets, markers, printed out materials (product care activities)?

#### *Sensitizing*

- Providing the participants with a limited amount of information about the topic Design for product care. In this way they have an idea beforehand what the topic is about. This should briefly explain what the definition of product care is.
- Send 1 A4 beforehand, with a short explanation about product care, the product care groups and an assignment before the session.
- Ask them to come up with 3 examples before the session. 1 product that you maintain and 1 that you repair, try to come up with a product that probably not everyone would choose (such as a bike), and 1 that you (often) fail to do anything to.

#### *Before the session (20)*

- Prepare room/materials/snacks/drinks
- Meebrengen: waterkoker, bekertjes, thee, 2 kommetjes
- Kopen: normale postits, grote postits, markers, nootjes, pure chocola,
- Hang up/laying down papers

#### *Opschrijven:*

- Hoe kan een product ontwerp de gebruiker stimuleren om product onderhoud uit te voeren?
- Product Care

#### *Printen:*

- De product care behaviors 6 keer
- Een vel met verschillende producten (koffiezetapparaat, stoel, speakers, rugzak, lamp, kastje, gietijzeren pan, oortjes, hardloopschoenen, eettafel)



- Een lijstje met producten + wat voor product care uitgevoerd moet worden, voor elke product categorie 2.
- Papier met The essentials for Designing for Product Care:

## Creative session

### Tijdens sessie

#### *Introduction (10)*

- Kleine introductie, mijn afstuderen gaat over Ontwerpen voor Product Care, oftewel product onderhoud. Product care zijn alle activiteiten die een gebruiker kan doen die bijdragen aan de lifetime van een product, dit is reparatie, schoonmaken, hoesjes om je telefoon, niet met een vork in de pan, alles. En de focus ligt dus heel erg op het gedrag van de gebruiker, want je kan een product zo ontwerpen dat het mogelijk is om het te onderhouden, op wat voor manier dan ook. Maar je moet dan nog zorgen dat de gebruiker het ook doet.
- Consent form.
- Snelle introductie: Naam, wat je studeert, en 1 voorbeeld van een product die je wel onderhoud, en 1 die je niet onderhoud.
- All others present themselves and their examples. (Zelf hier de voorbeelden opschrijven/meetekenen)

#### *Problem statement (2)*

- De vraag tijdens deze sessie is: Op wat voor manieren kan een product design de gebruiker stimuleren om product onderhoud uit te voeren?
- Tijdens deze sessie is het doel om zoveel mogelijk kleine voorbeeldjes of ideetjes te bedenken van producten die de gebruiker stimuleren, ondersteunen of triggeren onderhoud uit te voeren. En het is compleet open of het product zelf de gebruiker ondersteunt, of dat het een extern product of service is die mensen hierbij helpen.

Optional: inform about ideation rules

Quantity breeds quality

Postpone judgment + no wrong ideas/answer

Hitchhike

Freewheel

### *Purge (3) (zittend)*

- (On the table is a big paper with product care, let the participants write all thoughts down with a marker on it)
- Get all first ideas out. Write everything down that comes to you. (If people get stuck: Aan wat voor activiteiten denk je, wat voor soort activiteiten doe je? Waarom? Welke niet? Waarom niet? En denk luidop!)

### *Problem finding*

#### *Time for questions (3)*

- Top! Ik hoop dat iedereen een beetje een gevoel al heeft nu bij product care. Ik had jullie een pdfje gestuurd met de verschillende varianten van Product Care, die kunnen jullie er straks altijd bij pakken ter inspiratie. Er is dus veel verschil tussen de verschillende typen product care, het varieert in hoeveel moeite het onderhoud kost, hoeveel tijd, of je er skills voor nodig of niet, maar ook hoe gemotiveerd je moet zijn om je ertoe te zetten.
- Dus even terug naar de vraag waar we antwoorden voor gaan proberen te verzinnen.
- Hebben jullie nog vragen over deze problem statement? Denken jullie dat dit een goede formulatie is voor het probleem? Inspirerend genoeg? Of zouden jullie het anders willen zien?
- (Voor het geval dat de vraag iets anders moet, die aanpassen.)

### *Diverging for ideating*

#### *Explanation (3)*

- We gaan zometeen in 3 rondes ideaten, dit doen we met z'n allen tegelijk, dus ga ook lekker verder door op andermans ideeën. In de eerste ronde gaan we kijken naar een specifiek type product care, dus eigenlijk focusen op het stimuleren van een bepaald soort gedrag. En dan twee rondes dat we los gaan op de producten die jullie hebben meegebracht als voorbeeld, en dan kijken hoe we zouden kunnen zorgen dat iemand die dingen goed onderhoud.
- Dus in deze eerste ronde gaan we kijken naar hoe je een bepaald soort onderhoud gedrag kan stimuleren, of ondersteunen of triggeren. Dus als je niet meer goed weet wat de groep inhoud, dan kun je het papiertje erbij pakken. Heeft iemand voorkeur voor met welke we beginnen? Oke dus stel je voor je moet iets repareren, op wat voor manieren zou je het makkelijker kunnen maken? Aantrekkelijker? Wat zou je motiveren om het wel te doen?

Hoe wordt de gebruiker erop attent gemaakt? Is er dan iets aan het product wat anders is? Wat opvalt? Wat als er niks aan te zien is, hoe zou het product je kunnen laten weten dat het onderhoud nodig heeft? En praat ook vooral luidop.

*Inspiration round 1 (14) staand*

- (Door elk type onderhoud gaan, 2 min per group.)
- So let's start with repairing, how could you make a user repair something. Is there a way to make them more motivated to do it? Can you make it easier? How can you push them? Persuade them? Trigger them? Just write everything down that comes to mind. Talk out loud.
- Repairing
- Reviving product
- Creating something new/different
- Preventive care choices
- Small care
- Mindful/instructed handling
- Routines

*(Bathroom) Break (5)*

*Choosing specific products (3)*

- Oke, in de volgende ronde gaan we producten kiezen die we meer product care friendly willen maken. We kunnen de voorbeelden gebruiken die jullie zelf hadden, dus het product waar je niet goed genoeg voor zorgt. Maar als je een ander of leuker voorbeeld hebt dan kan dat ook.
- (Choose 5 products from the examples they brought. If examples are too similar, they can come up with a new one or i'll mention one of my own. So I should have a few backup products as example ready.)
- (Even kort bespreken wat voor activiteit uitgevoerd zou moeten worden.)
- Laten we ze even rangschikken van het makkelijkste soort onderhoud, tot het moeilijkste soort onderhoud.

*Ideation round (own products) (15)*

- Laten we beginnen met het product wat in principe het makkelijkst zou moeten zijn om te doen.
- (Beweeg zelf ook actief, plak de post-its op de muur, en laat ze er omheen

plakken. Hoe zou je de gebruiker motiveren om dit gedrag te vertonen? Wanneer? Hoe zou het product je eraan kunnen herinneren? Hoe zou het je kunnen persuaderen om dat te doen? Wat zijn je barrières om het te doen? Hoe zou je daar overheen kunnen komen? En zeg je gedachtes luidop.

#### *Ideating round (each product category) (12)*

(Same as previous round. For each care activity group I will give a example)

- Household appliances
- Consumer electronics
- Means of transport
- Furniture and interior design items
- Clothes, shoes and accessories
- Sport equipment, accessories for hobbies and leisure

#### *Mini-break (3)*

- (Take pictures of the results of the ideation)

#### *Clustering (5)*

- Oke nu wil ik dat jullie in 5 minuten deze ideetjes gaan clusteren.
- Use a separate wall to start clustering. Hand participants random ideas from the ideation, in this way gently push them to just start somewhere. Remind them to talk out loud. Ask them questions about why they think things fit together.

#### *Wrap-up (5)*

- Look back on what they've made together with them.
- Everyone take it in, and write down in a few words what you think, as a designer, are the essentials for product care. The essentials for Designing for product care.
- Vraag kort in de reflectie wat zij denken dat zij nodig zouden hebben als ontwerper om ontwerp te kunnen ontwerpen wat goed inspeelt op mensen hun product care behavior.
- Thank them for their help.

## Appendix 9: Brainstorm with designers - results

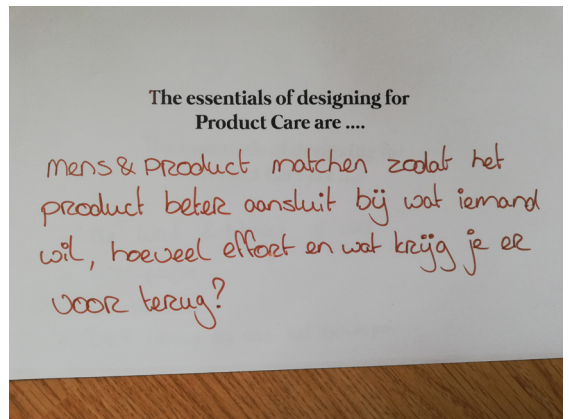
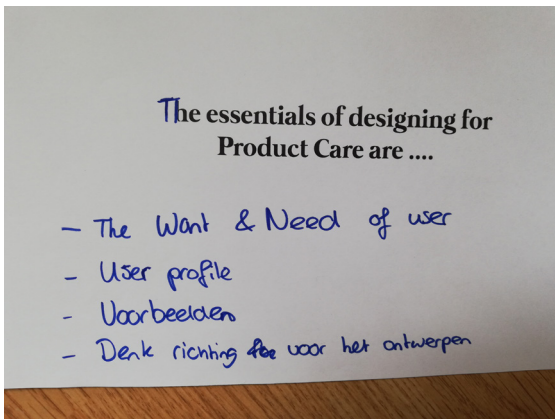
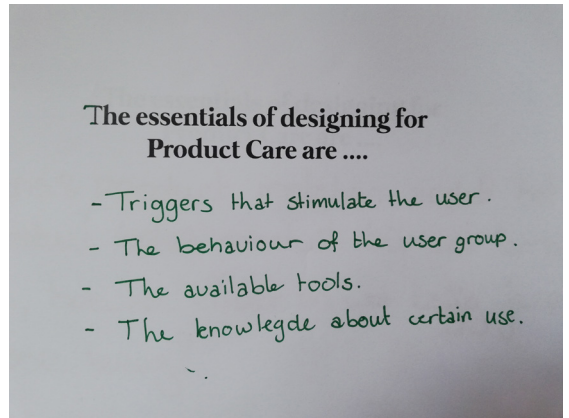
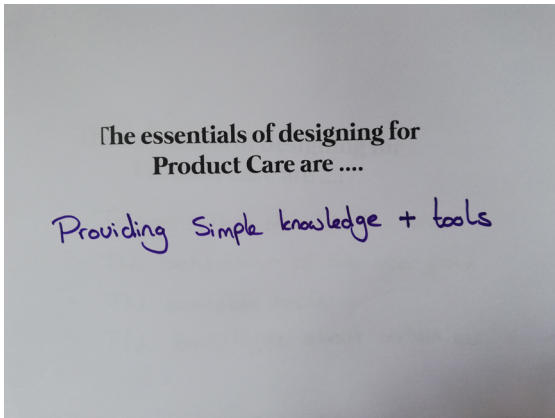
Group name – strategies	Solutions
<p><b>Waarde</b> – Waarde van het product naar voren laten komen, persoonlijke betekenis of waarde eraan toekennen (vertaling: Showing value)</p>	<ul style="list-style-type: none"> <li>- Product veel persoonlijke waarde geven</li> <li>- Waarde tonen. Of het nog dierbaar is.</li> <li>- Geef je tas karakter</li> <li>- “als nieuw” houden</li> </ul>
<p><b>Consequenties</b> – Bewustmaking van wat voor effect de gebruiker zijn/haar gedrag heeft op het product (negatief en positief). En ook product care verbinden aan een directe consequentie. (vertaling: Consequences)</p>	<ul style="list-style-type: none"> <li>- Eerdere problemen voorkomen</li> <li>- Beloning na actie</li> <li>- Regels (APK)</li> <li>- Beloning als je het wel doet</li> <li>- Product overdreven duur maken</li> <li>- Dure/nieuwe producten</li> <li>- Beloning geven</li> <li>- Boete/straf als e het niet doet</li> <li>- Laat consequentie zien</li> <li>- Grenzen aangeven</li> <li>- Laten zien wat het product aankan</li> <li>- Informeren over hoe goor het eigenlijk is</li> <li>- Doem scenario</li> <li>- Self destroy, als je het niet doet</li> <li>- Andere dingen blijven ook schoner</li> <li>- Groot contrast</li> <li>- Intense kraak als schroefjes niet goed zitten</li> <li>- Mogelijkheden (zelf, opsturen,etc)</li> <li>- Oplappen is <u>goedkoper</u> dan nieuw kopen</li> </ul>
<p><b>Service</b> – services aanbieden bij het product, op de hoogte stellen van bestaande services. Het toepassen van bestaande type services (zoals een proefperiode) voor andere soorten producten</p>	<ul style="list-style-type: none"> <li>- Fix it cafe/repair cafe</li> <li>- Ifixit.com</li> <li>- RepairBee</li> <li>- Plek waarcreatievelingen er iets nieuws van maken</li> <li>- Waar onderdelen? Info</li> <li>- The upcycle store</li> <li>- Bijna alles kan een lamp worden</li> <li>- 5 keer iets aan je tas laten vervangen (onderhoudsservice)</li> <li>- Tweedehands spullen cadeau doen</li> <li>- Onderdelen shop</li> <li>- Bed service (bij aanschaf)</li> <li>- Rent a bag (borg)</li> </ul>
<p><b>Kennis bij het product</b> – mensen instrueren van hoe iets gedaan moet worden en op de hoogte houden van hoe het gaat tijdens onderhoud en wat er gebeurt. Kennis van de gebruiker vergroten. (vertaling: Heightening knowledge)</p>	<ul style="list-style-type: none"> <li>- Gebruiks instructie leuk &amp; interessant maken</li> <li>- Tutorials</li> <li>- Tutorials</li> <li>- Tutorials</li> <li>- Tijdens gebruik ‘altijd’ een instructie te zien (logootes/plaatjes)</li> <li>- Plaatjes bij het product</li> <li>- Laten zien hoeveel mooier het kan</li> <li>- Track &amp; trace voor service</li> <li>- Psychologisch verslavend maken</li> <li>- Laten zien waar het stuk is</li> </ul>



<p><b>Kennis bij het product</b> – mensen instrueren van hoe iets gedaan moet worden en op de hoogte houden van hoe het gaat tijdens onderhoud en wat er gebeurt. Kennis van de gebruiker vergroten. (vertaling: Heightening knowledge)</p>	<ul style="list-style-type: none"> <li>- Laten zien hoeveel mooier het kan</li> <li>- Track &amp; trace voor service</li> <li>- Psychologisch verslavend maken</li> <li>- Laten zien waar het stuk is</li> <li>- Samen met iemand die weet hoe het moet</li> <li>- Laten zien hoeveel moeite het kost als je het uitstelt</li> <li>- Instructing how to clean</li> </ul>
<p><b>Emoties</b> – inspelen op de emoties en waardes van de gebruiker (vertaling: Emotions/emotional)</p>	<ul style="list-style-type: none"> <li>- Creativiteit</li> <li>- Smerig</li> <li>- Gevoel van verantwoordelijkheid</li> <li>- Schuldgevoel</li> <li>- Gevoel van accomplishment</li> <li>- “opruimwoede”. Gevoel van efficiency</li> <li>- Gezond</li> </ul>
<p><b>Product aanpassen/iets toevoegen</b> – Vanuit het product word gedrag gestimuleerd. Het product doet dit door zijn aangepaste uiterlijk, of verandert van uiterlijke kenmerken, of verandert op een andere manier merkbaar. (vertaling: Product changes/product shows)</p>	<ul style="list-style-type: none"> <li>- Al erin</li> <li>- Ontwerp zodat zo min mogelijk onderdelen stuk kunnen gaan</li> <li>- “Schoonmaak” functie “stomen”</li> <li>- Fabrics</li> <li>- Bacteriën laten zien in je matras</li> <li>- Zwart matras</li> <li>- Super zichtbare zweetplekken</li> <li>- Update systeem</li> <li>- Lichte binnenvoering</li> <li>- Materiaal makkelijk waterdicht → marketing</li> <li>- Bed super wankel maken → schroeven</li> <li>- Transparant wordende stof (op een bepaalde tijd/bepaalde locatie)</li> <li>- Label maken binnenin het product met info/telefoon nummers</li> <li>- Life changing experience as trigger</li> <li>- Externe trigger</li> <li>- Vuil zichtbaar maakt</li> <li>- Draaischijf blokkeert</li> </ul>
<p><b>Tools bij product</b> – Het meeleveren van benodigheden voor onderhoud (vertaling: Giving tools)</p>	<ul style="list-style-type: none"> <li>- WD40</li> <li>- Tools geven</li> <li>- Hoesje bij telefoon</li> <li>- Tools bijleveren</li> <li>- Universele repair tools</li> <li>- Klein instructie boekje</li> <li>- Speciale kleerhanger voor je jas</li> <li>- Vakje met schoonmaak/preventie tools</li> <li>- Trekker</li> <li>- Beschermingsmateriaal meeleveren</li> <li>- Klein schoonmaak setje erbij (bij aanschaf)</li> <li>- Houten spatel bij pan</li> <li>- Makkelijk maken</li> </ul>

<p><b>Tools bij product</b> – Het meeleveren van benodigheden voor onderhoud (vertaling: Giving tools)</p>	<ul style="list-style-type: none"> <li>- Bij aankoop 1 malig spray meeleveren</li> <li>- Probleem + tool matchen</li> <li>- Hoesjes/opbergsysteem</li> <li>- Borstel voor de deur dat je ze schoon <u>moet</u> maken voor je naar binnen gaat</li> <li>- Regen/zonbescherming</li> </ul>
<p><b>Matchmaking</b> – Bij aankoop kijken of je matcht met het product (vertaling:</p>	<ul style="list-style-type: none"> <li>- Koopadvies</li> <li>- Proef traject</li> <li>- Zoals first-time use van app</li> </ul>
<p><b>Enthousiasme</b> – Op leuke manieren awareness creëren en het verhogen van enthousiasme voor een product door middel van activiteiten (zoals challenges, events, etc.). Mensen enthousiasmeren.</p>	<ul style="list-style-type: none"> <li>- Wedstrijd</li> <li>- Waar?!</li> <li>- Gratis producten pimpen</li> <li>- Tv programma's</li> <li>- Event</li> </ul>
<p><b>Anderen involved</b> - Invloed uitoefenen door social pressure, ander maar ook het leuker maken van product care door het meer een sociale activiteit te maken.</p>	<ul style="list-style-type: none"> <li>- Social pressure</li> <li>- Geleende spullen</li> <li>- Influencers</li> <li>- Hulp vragen/ hulp bieden</li> <li>- Samen doen/ repair buddy</li> <li>- Peer pressure</li> <li>- Kleding inzameling. Behoefte laten zien</li> <li>- Platform waar tas gebruikers tips aan elkaar kunnen geven</li> <li>- Product juist opbergen</li> <li>- Schoonmaak sessies</li> <li>- Workshops</li> <li>- Gezelligheid/samen doen</li> <li>- Social pressure</li> <li>- Leren van ouders/mee opgroeien</li> <li>- Gezamenlijke producten aanschaffen</li> <li>- Gewoonte → aanleren vanaf het begin</li> </ul>
<p><b>Leuker maken</b> – Van product care meer een leuke activiteit maken/in plaats van puur onderhoud</p>	<ul style="list-style-type: none"> <li>- Humor</li> <li>- Game missie</li> <li>- Verrassingselement</li> <li>- Product loopt weg als je het niet doet</li> </ul>
<p><b>Reminders</b> – Focus op reminders en herinneren aan product care.</p>	<ul style="list-style-type: none"> <li>- Zwaailichten en alarm</li> <li>- Reminder voor taakjes die maar 1x per jaar hoeven</li> <li>- Reminders</li> <li>- Rooster</li> <li>- Waarschuwing</li> <li>- Planning, bijhouden voor het laatst gerepareerd</li> <li>- Alarm</li> <li>- Reminder krijgen wanneer nodig</li> <li>- Reminders op het goede moment</li> <li>- App die een reminder stuurt ( zoals Plantsome)</li> <li>- App erbij met info</li> <li>- Tijd</li> <li>- Rood lampje/alarmbel als kapot</li> </ul>

<b>Reminders</b> – Focus op reminders en herinneren aan product care.	<ul style="list-style-type: none"> <li>- Notification/pop-up dat je iets moet aanpakken</li> </ul>
<b>Overig</b>	<ul style="list-style-type: none"> <li>- Hoe dan?!</li> <li>- Meten = weten</li> <li>- Verhuizen ( nieuwe omgeving = nieuwe routine)</li> </ul>



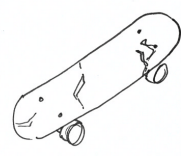
# Appendix 10: Ideation results - of myself

15446  
  
 mindful handling (ability) participate

a blender that if too hard/big products are put in, they form a 'poop' that is edible, but probably not very great. It poops out ingredients that should've been in your dish. If you're done so perfectly it becomes a nice 'poop'

→ motivating you to only put things in there if you handle

52256  
 small case evolve (trigger) touch



cracks & damages can be waxed. This wax has a golden coat colour though.  
 Similar to Kintsugi, where pottery is broken & repaired again  
 Here the board becomes more beautiful everytime you wax (maintain) it. So you start with a blank/empty board, but it becomes/evolves after using it (& waxing) telling stories of when certain damages were made

32232  
  
 (triggers) creating something new/different expand

perhaps not intended, but perhaps it captures the surface it is very easily indented (although you don't notice it straight away (like when writing on paper, it is pressed into the paper underneath))  
 If it is ~~not~~ cleaned / lacquered the patterns of where you leaned on it, your writings, the lamp base books all becomes visible. Like an artwork for a moment. Makes you think of how you've been using it lately

23153  
 small (activity) small case reflect



A car should be checked every now and then, perhaps oil added, some a windowwipe stuff.  
 The first times the car gives a warning that oil should be checked. At the same time a very specific smell (perhaps mint) is released. After first few times, the car releases the scent (but not necessarily a warning) but through smell you associate it with having to check oil

a platform where you post successes & tips when it comes to product care



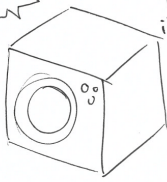
you break & rebuild your dishes. Making them unuse & fun to break =>

a holder for your earphones that looks like something spilling their intestines  
 so put them in properly

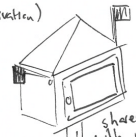
gloves that work the same as wipes. but through these gloves you're close to the product, touching it & cleaning it at the same time

After decalcifying it makes purring sounds & lights that look like eyes light up  
 a bit like BB8 sounds

cleaning rag for paintbrushes  
 it becomes a piece of art itself

AARGH  
  
 it screams when it needs repair/maintenance

514344  
 (motivation) mindful handling engage



shared library with neighbourhood they place stuff they don't need anymore or requests for specific stuff or help

or product just stops working till you do it (like the coffee machine of Ruth)

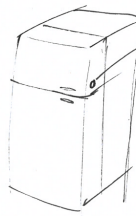


Design for Product care



parents/grandparents give their kids a book with self-written tips & advice for when they go live on their own (like a family photo album)

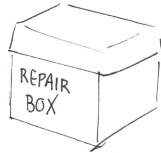
existing template



sticker that changes colour after being exposed to air for x time. So you know its time for a regular checkup

(like stickers that change when batteries are dead)

badge reward system, you receive the badge through a service repair service



A box that can be send to your house which you place broken things in that need fixing. They collect it for you & return it when fixed again



steam of water boiler is turned in other colour! (through a special filter) needs a ~~diff~~ replacement/replacing of filter. (like the smoke of the pope means different things)

An online service that 3D prints spare/broken parts. You just scan your product & 3D printer can give you a replacement



filter personalized clothing, systems where you can adjust/alter almost anything. (making it really fit your identity)

easy peasy! you can do it!

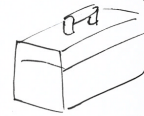
you've done it before!

motivational toolbox

toolbox has motivational messages on it

post apocalyptic game that has a storyline related to the world ending up like this because of people trashing their stuff

toolbox as a family heirloom



toolboxes that can be personalized, also a more classic appearance. Like a wooden jewelry box

best of both worlds

necessary cleaning tools provided with iron skillet. (just 1 set, making them get used to cleaning it with those specific products)

virtual reality simulations of the repair task at hand, making the user less insecure on what to do & seeing it from 1st person perspective



a list that makes you perform care much closer, smaller/delicate movements. Much more attention & savouring (TU Delft project?)

manual as a comic, making it more accessible & fun to read



it fills up after multiple uses, after it's full, the shower head & such should be decalcified

a thingy for on the wall of your shower



phone is connected to electronic products. It keeps track if you have maintained them & post sharing updates on social media if you don't do it often



A product that needs 2 sets of hands to clean it, so you have to ask someone to join you



for complicated tasks (such as repairing a dishwasher) the company/repair service is automatically contacted. So they will contact you

vase changes pattern/colour after cleaning it. So you have a new one every time you clean it



product looks like its sick when it needs product care

You get personal messages of your electronic devices if they need product care/ have an error /etc. It talks like a person to you



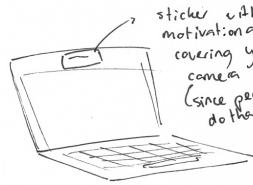
product sends a message on your behalf to random friends asking if they can help with repairing /fixing something



water bottles exterior show patterns of (fake) mold creeping down. These become visible every 2 days, making reminding you it otherwise becomes unsanitary



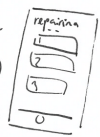
product/alarm clock opens up if he needs help/attention



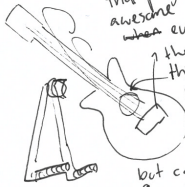
sticker with motivational text covering your camera (since people often do that now)

perhaps funny-ish texts: 'back me up here, babe.'

App with tutorials that for repairing (also offline available)



clip on thing that plays an awesome rock then when things have to be replaced. You feel like playing but can't fill gaps & replaced them or the holder does



AR app that gives ideas for pimping products you have



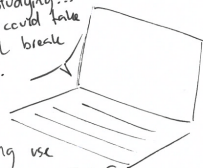
Or an online community that you can post pics to and that other people can comment with ideas on how to pimp it

& that they encourage each other, give tips & perhaps even collaborate

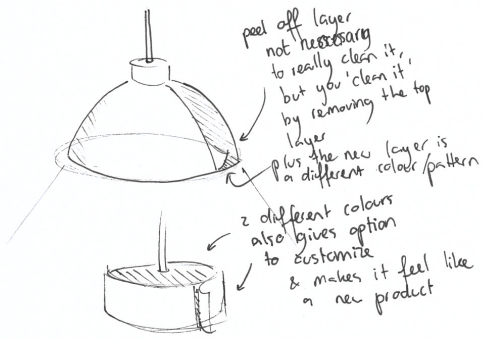
mathquard case showing how many money you've lost up till now by losing your mathquard since you didn't store it properly



hey, you could continue studying... but you could take a USEFUL break & fix ...

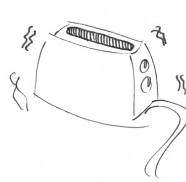


making use of people's SOG behavior. ↳ studie on: hylend gedrag. Telling they could take a useful break off of work/study & fix something



peel off layer not necessary to really clean it, but you 'clean it' by removing the top layer plus the new layer is in different colour/pattern  
 2 different colours also gives option to customize & makes it feel like a new product

teacup with pattern of fishes / or perhaps creepy creatures that only become apparent when the cup is very stained/dirty  
 the pattern is made of a material/coating that becomes less dirty less quickly. You see these 'dirty' things only when the cup isn't cleaned enough



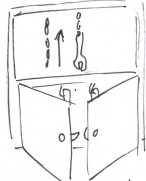
broodrooster gaat grammer / tenrum goeien vanner er roveel krumels in cisten of eens in de roveel tijd



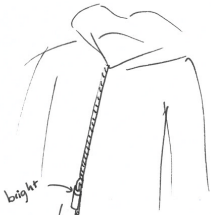
alarm clock that is connected to your calendar. Once every so many days when it notices you have a calm planning for the day it goes off 15 min earlier, so you can incorporate 15 min that morning into cleaning / small care



(IoT) a caterpillar that is connected to your laptop/phone and starts crawling around the room when it is time for a backup/cleanup



cupboard with tools (perhaps for specific product) when repair/maintenance is needed, it's being lifted up



after a year of using or so, the zipper glides off showing a bright underlayer or perhaps text 'oil me telling you it's time to oil'. You can just move the cap over it whenever you want.

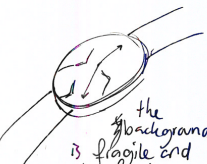


your visitors die als ze vrier wouder, ~~een~~ Monster patroon warmer. Wat det deel Lord extra sneel vies  
 should be visible



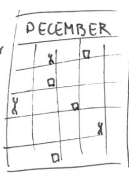
when it needs to be deodorized it turn away from you when you try to use it shaving it's back

but gives of a (not that chill) smell once a month, making people think it should be checked/cleaned  
 remaining them of food gone bad



the background is fragile and can be fractured easily. It can be pretty, but it will be unique for every piece, it at the same time reminds you that it's fragile and should be handled mindfully

like the advent calendar not just garbage days, but also days that you should do something related to product



made perhaps by repair cafes & the municipality

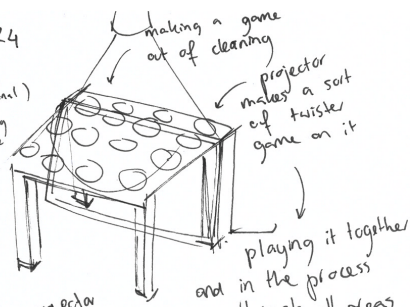
adds for product code on youtube & on the internet





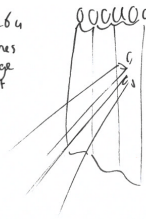
54324

Sound (motivational) engaging



the projector announces who has to wipe where

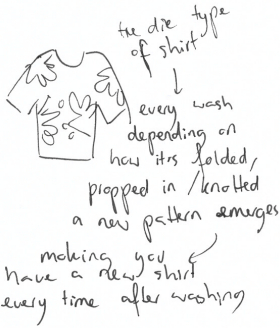
3#1264 routines engage sight



curtains that after not washing it for a while let through more sun (in the form of images/pattern) to have it functioning as darkening curtains you need to wash it again

perhaps that effect happens through touching it (because you open & close it every evening)

42335 touch creating something new participate



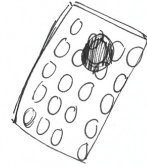
making you have a new shirt every time after washing



like the pillow that change if you rub it in opposite direction

rubbing yourself when wearing it

fabric is similar, making it able to let you form new patterns by rubbing yourself



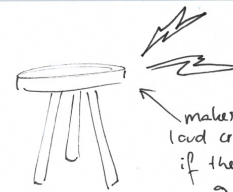
phone covers that look like bubble wrap, indicating the contents are fragile



everyone touches it there

copper sink, you see the places you've touched it, reminds you of all the times you've stood there

perhaps also interesting for stair base arm support



makes a very loud crack noise if the screw is even a little loosened

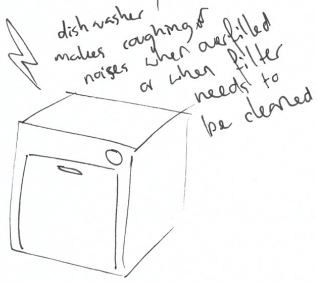


associate coming home with taking off shoes, hanging keys & having easy access to tools



(always in sight when you come home, just in case you remember something is broken)

or it makes you think of repair



dish washer makes coughing noises when overfilled or when filter needs to be cleaned



you set a digital to do list (urge to finish it this week)

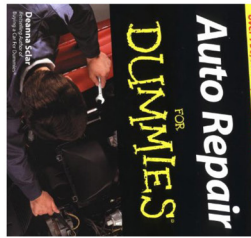
it adds a maintenance/small care activity every week

it feels stupid if it's left unchecked ✓

## Appendix 11: existing product solutions



customizable templates for sneakers



common books that explain repair



apps that support/explain repair and maintenance to you



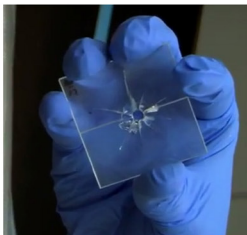
baby clothes hold dear memories about the past or hopes for the future



tankstations are available everywhere, making filling up your car with gas/fluids/etc accessible



each tankstation has machines that help doing things like pumping your tires and cleaning your car



a self healing plastics



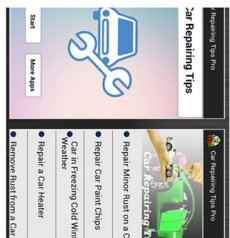
adjustable glasses, they can be altered to your eyes. So you'll never need new ones



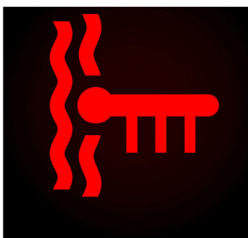
white sneakers where dirt is quickly visible



IKEA hackers give examples on how Ikea products can be rebuild/made into different product



apps exist that give explanations on how to do maintenance/repair of your car



car interfaces give signals when there is something that needs checking/maintaining/replacing/repairing



RECLAIM CONTROL OF YOUR CRAFT! building your own camera module to module, knowing how parts works



a baby crib which holds memories



a baby crib which hold memories



products that obviously need to sustain rough terrains/use are often better prepared/cared for afterwards



by making products yourself, people feel more responsible for the product afterwards (DIY)



garages exist where people are allowed to try and repair their car themselves and can receive help and tips if they need it





it's socially frowned upon if your toilet is visibly dirty, also it becomes smelly, thus irritating and embarrassing



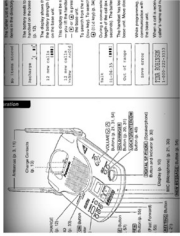
some products remind people of where they come from or of different times



some people fit with people's identity or remind them of times/people



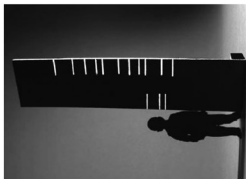
this cup Domoor was given to me by my University when I graduated from my bachelor, I still use it every day/clean it



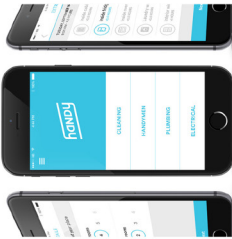
many devices are provided with a layout of the product, explaining the different parts and functions



the Dopper is made in such a way that it is also easier to open it up and properly clean it



the lamp shows the growth of your child over time, being not only a lamp, but also encompasses memories



app that connects you with other people/professionals that can help with repair/maintenance

IFIXIT

a platform that gives tutorials for repairing almost anything



Egg helmets can be personalized



this Auping Arondo bed can be easily dis- and reassembled and be upgraded with other parts



family heirlooms are often maintained so they can be handed to the next person in line



this table can be easily disassembled and reassembled in other ways



photoalbums hold many dear memories that people don't want to look



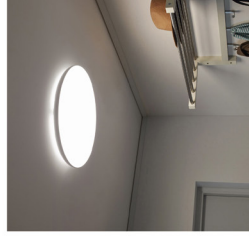
Kintsugi is when dishes are broken and then reassembled with gold glue and considered even more beautiful now



Rotterdam now placed pumps for bikes near bikepaths, making it more accessible to pump your tires

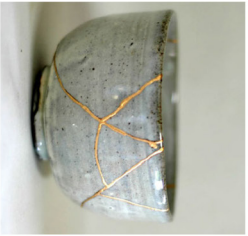


many products have a warranty on their products, making it possible for consumers to send their products back to fix them



if a ceilinglight in your house stops working, you have no light and cannot do other activities (that easily)





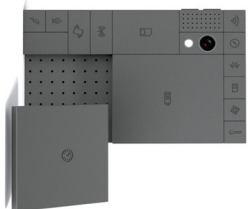
kintsugi sees these broken products that are repaired as even more unique



when a bikechain needs oil/ checking it often makes an obvious rattling noise



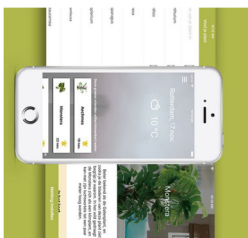
each bead on a bracelet often holds a memory



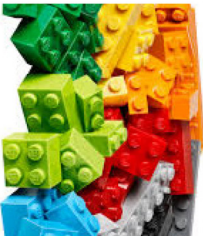
phoneblocks lets the user change and upgrade the parts of their phone to their current needs



photoframes hold memories



plantome reminds the user when they need to take care of their plants



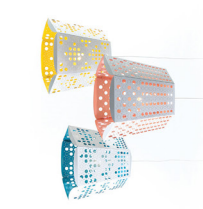
lego can be made into everything, broken down, and being made into something new. It's also timeless



htc often offers free simple phonecovers with their phones



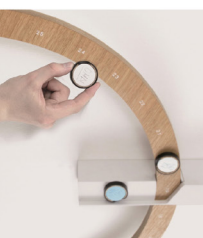
this mini-bicycle tire pump fits in your purse, you can bring it with you



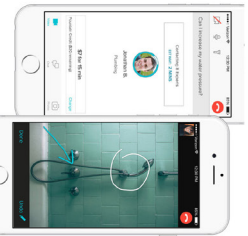
these lamps can be customized by the user by popping their own desired patterns



new materials are able to repair themselves



this clock can be used to remind the user to a task they wanted to do, for example cleaning up/repairing



brings you into contact with experts that give you real-time tips and advice



the TU Delft has a service centre for those who buy a laptop there. You always have access to this service



peerby lets you borrow your neighbours stuff, they trust you to take care of it



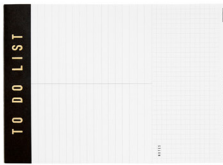
repaircafes lets people get help from other people from their city with repairing



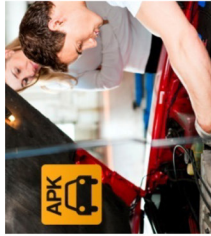
repair cafes promote repairing behavior instead of throwing things away



bike repair poles have all the basic tools that are needed to repair your bike



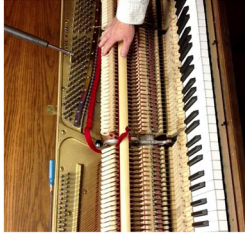
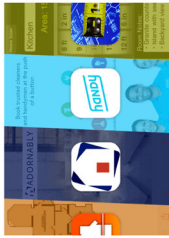
people prefer to finish to do lists, when product care tasks are put on there, they might want to do it eventually



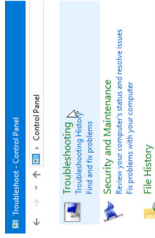
APK is a checklist that is compulsory



ikea hackers promoting the greatest ideas for altering your products



if a piano is out of tune it's less nice to play (the feeling can be less nice, same for the sound, can be annoying)



windows provides a troubleshooting function that helps users to find out what's wrong with the laptop



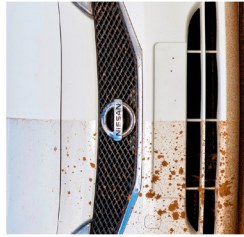
many tools/parts are universally compatible



tomado is a shelving system that can be adjusted to your own liking, upgraded, reassembled



these bike repair poles are placed at many buildings at the TU Delft, so students have the necessary tools everywhere



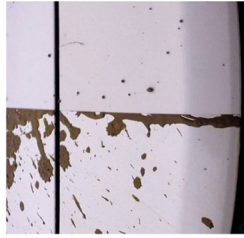
nissan developed a coating for cars that repels dirt



some products such as old motorbikes are bought by users that know they will need to maintain them often, otherwise they will break down



clothes often provide the user with one or a few extra parts such as buttons



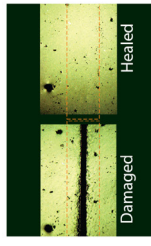
dirt is repelled by this coating and thus cleaning is made easier



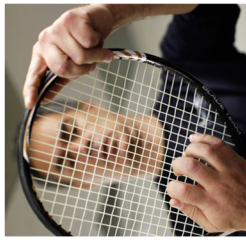
swapfiets takes over the repair/maintenance task of users, the user pays per month for a bike & gets a new one if broken



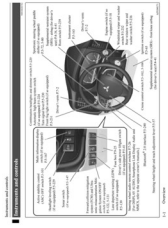
a pocketknife can be carried around whenever you want and has a few basic tools that can be used for quick repairing



some materials can heal themselves over time if they break



when the strings of tennisrackets become less tight you can feel it during use and when feeling the strings



many products come with clear instructions on how they should be used and what things means





## WHAT CAN WE DO?

One person, a consumer, a user, can already look into their own habits and behaviors and see how they can behave more sustainable. For a circular economy, we not only need sustainable production and products, we also desperately need sustainable behavior.

Sustainable behavior can help products stay usable as long as possible. The easiest way for this to happen is if consumers take care of the products they own, resulting in an extension of the product's lifetime, extension of use and a slowed down resource flow.

If designers are able to evoke this sustainable behavior, we can make a positive impact on the strain we have on the world. This tool provides inspiration and insights on how to create this sustainable behavior: Product care.



## WHAT IS PRODUCT CARE?

Product care can be understood as any action that helps to prolong the lifetime of a product, such as maintenance or repair. These product care activities could be conducted by the consumer itself or by a service.

The throwaway culture that we live in has made it often far easier to throw away products and buy new ones, instead of maintaining and repairing the things we have. But by evoking behavior within the consumer that persuades or stimulates them to maintain or repair their belongings, the lifetime of products can be lengthened and thus can be considered more sustainable.

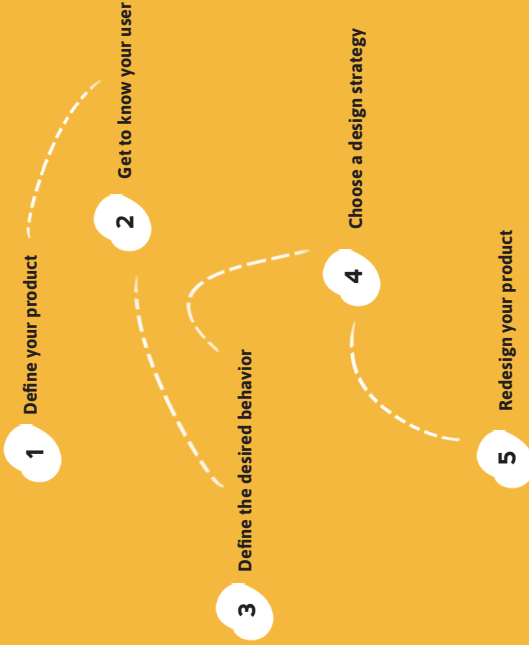
Product care is the most efficient and least energy consuming way of keeping resources in the loop.

## WHAT IS HAPPENING IN THE WORLD?

Over the years, multiple studies and reports have tried to make us consumers face the facts: our materialism has put a strain on the resources of the world that we live in. The scarcity of resources will be a huge problem in the future for production and it will become more and more valuable to bring these resources back into production.

The world we currently know runs as a linear economy, with a 'make, use, throw' mentality. We need to shift towards a circular economy, where the resource flow is being slowed down and materials are kept in the loop (longer). This can be achieved through timeless design, maintenance, repair, reuse, remanufacturing, refurbishing, recycling, and up-cycling.

But completely changing the system and shifting to a durable and sustainable economy is a difficult and long process. Industries over the world together, have to change the way they work, to make this possible. So knowing this, what could you already do contribute to this shift?



## 5 STEPS FOR DESIGNING FOR PRODUCT CARE

The next pages present a step-by-step tool to help you design for product care. Apply this tool in your designing process when you already have a conceptual product or service idea, or are planning to redesign it and want to ensure that your design evokes or stimulates product care behavior.

This tool will help you think about your design, the user you are designing for and what kind(s) of product care behavior you desire from them. When you have defined what product care behavior you want

to evoke, you gain knowledge about the different design strategies for product care. If needed, the explanations of these design strategies are available on the cards that were included with this tool. And on the small cards you can find examples of these design strategies incorporated into design.

In the end you shall develop a rough redesign based on the design strategies that were provided to you.



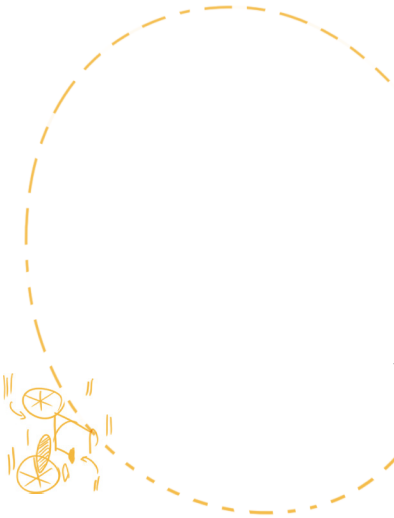
# DESIGN FOR PRODUCT CARE

## Five steps for designing for product care

1. Define your product - what is it, where is it used...
2. Get to know your user - who are they, what drives them, what are barriers for them....
3. Define the desired behavior - what type of product care behavior, the specific activities, what does the user require to do..
4. Choose a design strategy - what strategies are there, possibilities of applying them, behavioral strategies...
5. Redesign your product - define the new user-product interaction, define how your design has changed, define how the desired behavior evoked...

1

**What is your design/concept? What's the context?**  
(Draw it! Describe it! What is its intended user? Where is it used? Also describe or draw the contexts in which it is used.)



2a

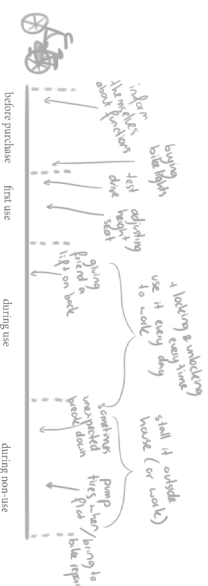
**Who is your user?**  
(Draw them! Describe them! What could their motivations to perform product care be? What could possible barriers for them be?)



2b

**What would the user-product relationship look like now?**

(Which actions does the user do with the product throughout its life? Think about normal activities, good activities (such as product care) but also bad activities (that may impact your design negatively). Draw/write it on the top of the timeline! To make it easier, first divide its life in different phases.)



TIMELINE



# DESIGN FOR PRODUCT CARE

Five steps for designing for product care

1. Define your product - what is it, where is it used...
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3a

## What type of product care?

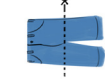
(What type of product care behaviors would be interesting for your product? Think about which types of product care are possible for your product. Read up on the different product care behaviors if needed!)



**Repair.** The product or a part of it is broken, preventing it from functioning or performing poorly. The user performs product care activities that will make the product be able to function again. This can be the reparation of existing parts of the product, or the replacement of parts.



**Reviving product.** The user tries reviving the product to a certain standard again. This could be to get it functioning better again or to regain a certain look.



## Creating something new/different

The user creates a product themselves, let's something be made for them, or they rebuild/remodel/reform an existing product so it feels like a new, different or unique product.



**Small care.** Nothing of the product is broken. Small activities are performed consciously to liven up the product again or to prevent it from deteriorating.



**Preventive measures.** These are preventive measures taken to make sure a product won't break as quickly. These measures often contain external products that equip or protect the product against its environments.



**Instructed & mindful handling.** The user knows or feels what behaviors would be bad for the product. This could be by having read a manual, learning about it from others or just by experience. The user tries to prevent deterioration by abstaining from bad behavior/only performing the proper behaviors.

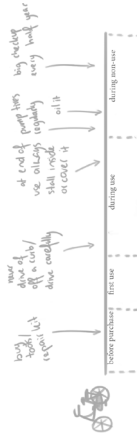


**Routine acts.** The user performs routine activities unconsciously. These are activities that they have learned to do and have never thought about doing differently or activities that were made into habits.

3b

## Which product care activities? When?

(Define which specific product care activities can be performed on your design. Also indicate on the timeline when these are done or how often.)



## TIMELINE

3c

## What is the desired product care behavior?

(Which product care activity/activities do you want to focus on? Explain what that behavior consists of, what should be done and how often.)



# DESIGN FOR PRODUCT CARE

## Five steps for designing for product care

1. Define your product - what is it, where is it used...
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4a

**Which design strategies could improve your design?**  
(The aim this step is to gain inspiration for your desired product care behavior. Read through the different design strategies for Product care. Some strategies might fit your situation better than others, check the examples on the cards for more inspiration.)



**Enabling.**  
Make product care behaviour easier for the user to perform, by providing the necessary tools, means or help and thus lowering the threshold for product care behavior.



**Social.**  
Make use of social connections, with social connections as a result or as the facilitator of product care.



**Experiences.**  
Make use of the emotions a user can experience due to product care itself, of the emotions experienced beforehand due to expectations and of emotions experienced during and after performing product care..

4b

**How can you apply this to your own design?**  
(In what ways could you apply this/these strategies to your product? Keep your user in mind. Keep the context of the product in mind. Where are unseen opportunities?)



**Appropriation.**  
Create appropriation possibilities for the user, by providing personalization possibilities, changeable products or stimulating the user's creativity.

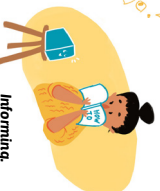


**Control.**  
The design plays a dominant role in the relationship, by making decisions itself, by steering the user unconsciously or even forcing the user to perform product care..

(SPACE TO DOODLE)



**Change.**  
The design creates a disruption or change in the day to day routines of the user to bring attention to product care..



**Informing.**  
Heightening the knowledge of the user, through traditional forms of information, through interactive sources of information and through information hidden in the form of your design.



**Reflecting.**  
Make the user reflect on what value a design has to them, through the meaning of the design, or the memories or stories they contain.

## DESIGN FOR PRODUCT CARE

Five steps for designing for product care

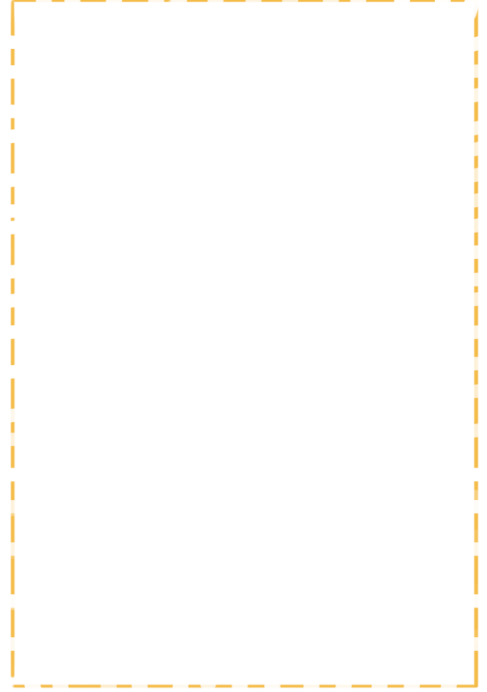
1. Define your product - what is it, where is it used..
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4. Choose a design strategy - what strategies are there, possibilities of applying them, behavioral strategies....
5. Redesign your product- define the new user-product interaction, define how your design has changed, define how the desired behavior evoked....

5a

### What should the redesigned user-product relationship look like?

(In what way will your design stimulate the user to perform the desired product care behavior you chose? Draw/write on the timeline how this interaction between your design and the user unfolds. )

TIMELINE



5b

### What does your redesign look like?

(What is redesigned, which new interactions will take place? How does the redesign evoke these new interactions and/or behaviors? Explain or draw in what way the product should be redesigned.)

DESIGN STRATEGY  
**CHANGE**



THE DESIGN CREATES A DISRUPTION OR CHANGE IN THE DAY TO DAY ROUTINES OF THE USER TO BRING ATTENTION TO PRODUCT CARE.

DESIGN STRATEGY  
**APPROPRIATION**



CREATE APPROPRIATION POSSIBILITIES FOR THE USER, BY PROVIDING PERSONALIZATION POSSIBILITIES, CHANGABLE PRODUCTS OR STIMULATING THE USER'S CREATIVITY.

DESIGN STRATEGY  
**EXPERIENCES**



MAKE USE OF THE EMOTIONS A USER CAN EXPERIENCE DUE TO PRODUCT CARE ITSELF, OF THE EMOTIONS EXPERIENCED BEFOREHAND DUE TO EXPECTATIONS AND OF EMOTIONS EXPERIENCED DURING AND AFTER PERFORMING PRODUCT CARE.

DESIGN STRATEGY  
**INFORMING**



HIGHLIGHTING THE KNOWLEDGE OF THE USER, THROUGH TRADITIONAL FORMS OF INFORMATION, THROUGH INTERACTIVE SOURCES OF INFORMATION AND THROUGH INFORMATION HIDDEN IN THE FORM OF YOUR DESIGN.

DESIGN STRATEGY  
**ENABLING**



MAKE PRODUCT CARE BEHAVIOUR EASIER FOR THE USER TO PERFORM, BY PROVIDING THE NECESSARY TOOLS, MEANS OR HELP AND THUS LOWERING THE THRESHOLD FOR PRODUCT CARE BEHAVIOR.

DESIGN STRATEGY  
**CONTROL**



THE DESIGN PLAYS A DOMINANT ROLE IN THE RELATIONSHIP, BY MAKING DECISIONS ITSELF, BY STEERING THE USER UNCONSCIOUSLY OR EVEN FORCING THE USER TO PERFORM PRODUCT CARE.

DESIGN STRATEGY  
**REFLECTING**



MAKING THE USER REFLECT ON WHAT VALUE A DESIGN HAS TO THEM, THROUGH THE MEANING OF THE DESIGN, OR THE MEMORIES OR STORIES THEY CONTAIN.

DESIGN STRATEGY  
**SOCIAL**



FOCUSSES ON CREATING SOCIAL CONNECTIONS, WITH SOCIAL CONNECTIONS AS A RESULT OR AS THE FACILITATOR OF PRODUCT CARE.

## DESIGN STRATEGY CHANGE

### Possible design directions:

#### Reminders

by making your design notify and remind users of product care activities that should be done or that they have planned themselves.

#### Motivational triggers

by making your design wish or motivate the user to perform product care with motivational messages.

#### Signals

by making your design indicate to the user what type of product care is needed, by for example visual or auditory messages.

#### Product changes

by making your design wish its appearance or behavior and thus bring a change in the user's daily life, by for example making strange noises, changing shape/texture or interacting differently. These changes can show their link to product care very directly, or they can be subtle and ambiguous changes.

#### Change in functionality/performance

by making your design change its functionality and/or performance when product care is needed.

## DESIGN STRATEGY APPROPRIATION

### Possible design directions:

#### Personalization

by making your design provide the user with the possibility to alter their product before/after purchase, to make it fit their personality and identity more.

#### Ever-changeable products

by making your design allow the user to change the use phase and its therefore capable of withstanding trends and can adjust themselves to the changing needs of the user.

#### Creative change

by making your design trigger or help the user to tap into their creative side.

## DESIGN STRATEGY EXPERIENCES

### Possible design directions:

#### Anticipating effects

by making your design try to evoke desired emotions before performing product care. These relate to thoughts the user has about the possible consequences of performing product care or failing or postponing product care. These can be positive and negative emotions.

#### Experiences during and after

by making your design try to evoke desired emotions and experiences during product care. Possibilities for this strategy are creating more pleasurable experience while performing product care behavior, or on creating positive feelings if they did and negative feelings if they didn't perform the necessary product care.

## DESIGN STRATEGY INFORMING

### Possible design directions:

#### Static info

by providing the user with traditional forms of information, such as providing them with static manuals or tutorials that they can consult.

#### Interactive info

by providing the user with information in terms of information that are interactive and change according to what the user wants or needs to know.

#### Physical information

by making your design explain what kind of product care would be necessary through the form of the design. This form is not necessarily experienced by the user as a source of information and users are often informed unconsciously through affordances.

## DESIGN STRATEGY ENABLING

### Possible design directions:

#### Providing flexibility

by making your design compatible with the standard tools and means that the user has to their disposal or should make the necessary tools accessible.

#### Providing necessary means

by making your design provide the necessary tools or means for performing product care.

#### Providing help

by making your design support the user with their product care activities, or by providing the product care itself.

## DESIGN STRATEGY REFLECTING

### Possible design directions:

#### Meaningful memories

by making your design hold, represent or stimulate making memories and connecting personal meaning to it. This strategy focuses on creating a strong emotional connection between user and design, in this way product care is stimulated because users feel attached to your design.

#### Traces

by making your design tell a story and show beauty by showing the wear or traces on your design, making the user reflect on the meaning of those traces and their relation with your design.

## DESIGN STRATEGY SOCIAL

### Possible design directions:

#### Social connections as a result of product care

by making your design evoke social connections or interactions by making social activities part of product care activities.

#### Social connections as a facilitator for product care

by making social connections or interactions support the act of performing product care.



# Appendix 13: card set iteration



## DESIGNING FOR PRODUCT CARE

### CIRCULAR ECONOMY

Over the years, multiple studies and reports have tried to make us consumers face the facts: our materialism has put a strain on the resources of the world that we live in. The **scarcity of resources** will be a huge problem in the future for production and it will become more valuable to bring these resources back into production.

The world we currently know runs as a linear economy, with a 'make, use, throw' mentality. We need to shift towards a **circular economy**, where the resource flow is being slowed down and materials are kept in the loop (longer). This can be achieved through **timeless design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling**.

This design tool focuses on changing the user's behavior and to make them perform **repair, maintenance and care activities** to extend a product's lifetime and creating emotionally durable designs.

These sustainable behaviors can also be called **Product Care**.

### PRODUCT CARE

Product care can be understood as **any action that helps to prolong the lifetime of a product**, such as maintenance or repair. These product care activities could be conducted by the consumer itself or by a service.

The throwaway culture that we live in has made it often far easier to throw away products and buy new ones, instead of maintaining and repairing the things we have. By evoking behavior within the consumer that persuades or stimulates them to maintain or repair their belongings, the **lifetime of products** can be lengthened and thus can be considered **more sustainable**.

Product care is a very efficient and low energy consuming way of keeping resources in the loop. For other actions, such as recycling, energy has to be put into the resources to break them down to be usable for new products. With product care, the user puts energy into the loop in the shape of effort and time.

### CARD SET

This card set was designed to gain inspiration from in the idea generation phase of a designing project.

**The card set consists of:**

- 7 Product care cards - These cards describe the different types of product care activities.
- 8 Design strategy cards - These describe the different design directions a designer can think in.
- 8 User persona cards - These can be used as inspiration for designing for a specific user.
- 6 Product cards - These can be used as inspiration for designing for a specific product.

**A bunch of example cards!** - These are examples of the design strategies to derive inspiration from.

This tool will help to get a feeling for the many facets that one needs to take into account when designing for Product Care. After using this card set, you should have a better idea on how to make the user perform more repair & maintenance activities!

**On the other side of this booklet you can find an example of how this card set can be used!** Feel free to try it out, but also feel free to use and be inspired the cards in any way you want.

There is not one strict way or order to use the cards in. But to get a feeling for how you can use the cards, I'll give a small visual example!

This design process is when the design team already has a conceptual product idea and want to ensure that the user performs some standard repair and maintenance activities.

### What do you need!

1 or a few enthusiastic designers

surface to brainstorm on (paper, but also a whiteboard will work! Did you know that the cards are magnetic!)

#### 1. Setting a starting point

When you want to ensure your design is product care friendly, or you just want to learn about it, check the different cards the set contains.

When you already have a conceptual design, you start with the product card. Put that one on the paper/whiteboard!

#### 2. What do I know?

On the back of the cards are questions. Discuss these questions, write/doodle your thoughts down around the card. (Keep some space around to put new cards!)

#### 3. What kind of product care do I want to accomplish?

Now look at the product care cards, pick and place one you think the user should perform. After brainstorming on that behavior, do the same for a few more. Perhaps put them on a timeline.

#### 4. Who's my user?

Your type of use can have a big impact on how you can achieve the desired product care behavior. Different users have different strong and weak points and these influence their behavior. Pick a persona card. Which could fit your user or could be an interesting one? Think creatively!

#### 5. Design strategies

Now you have mapped information about your product, your user and what you desire from the user. Next step is delving into the different design strategies.

Read up on the different design strategies. Some might be more interesting for this specific product, this specific user, or the desired behavior, or the context it is used in.

#### 6. Examples for inspiration

On the small rectangle cards you can find product examples for each design strategy which might inspire you.

#### 7. Mix 'em up!

If you notice a card you picked didn't fit that well, if it's the product care behavior, the user or the strategy, you can always swap them around!

#### 8. Ideate!

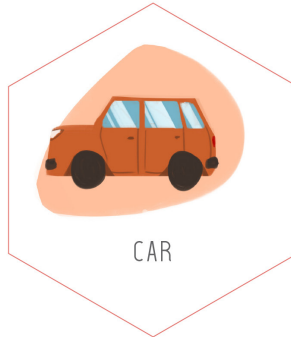
If you think you've gained enough inspiration, you can start ideating and create some first small product ideas!

There is not one set way of using the cards, just.

feel free & feel creative



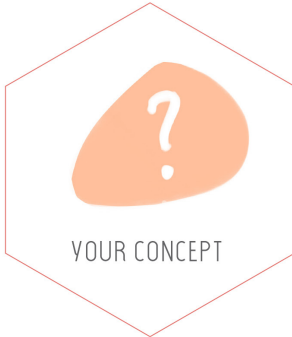
LAPTOP



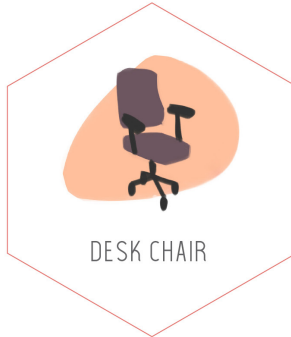
CAR



BACKPACK



YOUR CONCEPT



DESK CHAIR



HIKING BOOTS



LAPTOP

**Think about this product:**  
 What is it intended use?  
 Why do you use it?  
 Where and when do you use it?

**Think about how it is treated:**  
 What interactions does the user have with it?  
 (From pre-purchase to disposal.)  
 In what non-intended ways is it also used?  
 Which forms of product care can be applied to  
 this product?



CAR

**Think about this product:**  
 What is it intended use?  
 Why do you use it?  
 Where and when do you use it?

**Think about how it is treated:**  
 What interactions does the user have with it?  
 (From pre-purchase to disposal.)  
 In what non-intended ways is it also used?  
 Which forms of product care can be applied to  
 this product?



BACKPACK

**Think about this product:**  
 What is it intended use?  
 Why do you use it?  
 Where and when do you use it?

**Think about how it is treated:**  
 What interactions does the user have with it?  
 (From pre-purchase to disposal.)  
 In what non-intended ways is it also used?  
 Which forms of product care can be applied to  
 this product?



YOUR DESIGN

**Think about this product:**  
 What is it intended use?  
 Why do you use it?  
 Where and when do you use it?

**Think about how it is treated:**  
 What interactions does the user have with it?  
 (From pre-purchase to disposal.)  
 In what non-intended ways is it also used?  
 Which forms of product care can be applied to  
 this product?



DESK CHAIR

**Think about this product:**  
 What is it intended use?  
 Why do you use it?  
 Where and when do you use it?

**Think about how it is treated:**  
 What interactions does the user have with it?  
 (From pre-purchase to disposal.)  
 In what non-intended ways is it also used?  
 Which forms of product care can be applied to  
 this product?



HIKING BOOTS

**Think about this product:**  
 What is it intended use?  
 Why do you use it?  
 Where and when do you use it?

**Think about how it is treated:**  
 What interactions does the user have with it?  
 (From pre-purchase to disposal.)  
 In what non-intended ways is it also used?  
 Which forms of product care can be applied to  
 this product?

# Appendix

### REPAIR

The product or a part of the product broken. This prevents it from performing completely, performing a certain function or performing poorly. The user performs repair activities that will make the product function again. This can be the repair of broken parts of the product or the replacement of broken parts.

**What parts of your product need repairing?**

**What kind of actions are expected from the user?**

Has been paired often with the following strategies:

- Informing
- Enabling
- Social

### CREATING SOMETHING NEW/DIFFERENT

There are different sort of activities that a product can undergo with this behaviour. The product is created by the user themself or the product is made by another party for the user. Or an existing product is remodeled/rebuilt/reformed so it feels like a new, different or unique product.

**In what ways could your product be transformed or altered by the user?**

**In what ways can creativity of the user be used to create a new or different product?**

Has been paired often with the following strategies:

- Appropriation
- Reflecting
- Social

### PRODUCT REVIVAL

The product is revived to a certain standard. This can mean that product care activities are performed in order to make the product work more fluently/look better, perhaps even as well as when it was brand new. It can also mean that after these product care activities the product regains a certain look or appearance again.

**In what ways could the product be revived so it looks like new (even after a long time of use)?**

**What can be done so that it functions better than before?**

Has been paired often with the following strategies:

- Change
- Reflecting
- Experiences



### PREVENTIVE MEASURES

Preventive care are measures that are taken to make sure a product breaks or deteriorates slower than usually, or preventive measures that try to prevent sudden breakages. These measures often consist of external products or services that equip or protect the product against its environments.

**What kind of breakages or deterioration should be prevented or postponed?**

**What does the user need to do to make that happen?**

Has been paired often with the following strategies:

- Appropriation
- Enabling
- Control

### SMALL CARE

Small care is done when nothing of the product is broken. These are small activities that are performed consciously to freshen up the product again, to maintain the quality of its aesthetics or its performance. Or activities that eventually help to slow down the process of deterioration.

**What sort of small activities can be done (regularly) to ensure the quality or performance of the product is upkeep?**

Has been paired often with the following strategies:

- Experiences
- Change
- Control

### INSTRUCTED & MINDFUL HANDLING

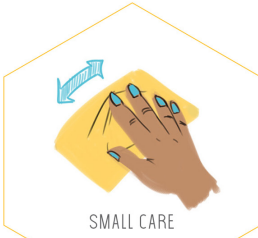
This means that the user knows or feels what kind behaviors or actions would be bad for the product. This could for example be by having read a manual, learning about it (from others), through imitation or by experience. The product is kept in a good state because the user abstains from behaviors or actions that negatively influence the state/behavior of the product. Or only performs acceptable behaviors or actions.

**Which actions can have a negative impact?**

**What are desired behaviors or actions of the user?**

Has been paired often with the following strategies:

- Reflecting
- Informing
- Experiences
- Control



### ROUTINE ACTS

Routine acts are product care related activities that the user performs unconsciously. These are activities that they have learned to do and have never thought about doing differently or activities that were made into habits. These activities can be similar to other product care types. The difference is that those activities are often performed consciously.

**What sort of daily patterns or routines does your user have?**

**How could necessary product care activities fit into the user's daily patterns and routines?**

Has been paired often with the following strategies:

- Experiences
- Informing
- Control

**Possible directions to think in:**

**Providing flexibility**  
How can you make your design compatible with standard tools and means that the user has to their disposal? How can you make the necessary tools for product care activities accessible?

**Providing necessary means**  
Can your design provide the necessary tools or means?

**Providing help**  
How can your design suggest the user with their product care activities? Or can you provide product care to the user?

**ENABLING**

**Possible directions to think in:**

**Anticipating effects**  
How can you make the user associate product care with feeling positive emotions? How can you make the user associate falling/postponing product care with feeling negative emotions? How can you make the user anticipate what will happen if they do or do not perform the product care activity?

**The experience of the activity**  
Can you create a more pleasurable experience for someone performing product care? How do you evoke the desired emotions and experiences during the product care activity?

**After-effects**  
How can you create positive feelings after a user performed product care? Or negative feelings if they didn't?

**EXPERIENCES**

**Possible directions to think in:**

**Motivational triggers**  
How can your design make them want to perform product care? How can your design push them to perform product care?

**Awareness triggers**  
How can your design indicate what type of product care is needed? How can your design notify or remind users of the product care activities?

**Product changes**  
How can your design change appearance or behavior to get attention for product care? Can you indicate directly or in a subtle/ambiguous way that product care is needed? How could it make use of sounds, of its shape/texture, of its way of interacting or other characteristics?

**Change in functionality/performance**  
How can your design change its functionality or performance to tell that product care is needed?

**CHANGE**

**DESIGN STRATEGY**  
**ENABLING**



THINK ABOUT HOW YOU CAN MAKE PRODUCT CARE BEHAVIOR EASIER FOR THE USER TO PERFORM. HOW TO PROVIDE THEM WITH THE NECESSARY TOOLS, MEANS OR HELP AND THUS LOWER THE THRESHOLD FOR THEM TO PERFORM PRODUCT CARE BEHAVIOR.

**DESIGN STRATEGY**  
**EXPERIENCES**



THINK ABOUT HOW YOU WANT PRODUCT CARE ACTIVITIES TO BE EXPERIENCED BY THE USER. MAKE USE OF THE EMOTIONS THAT CAN BE FELT BEFORE/HURING TO THE USER'S EXPECTATIONS AND LOOK INTO THE EXPERIENCES AND EMOTIONS EXPERIENCED DURING AND AFTER PRODUCT CARE ACTIVITIES.

**DESIGN STRATEGY**  
**CHANGE**



THINK ABOUT HOW THE DESIGN CAN CREATE A CHANGE OR DISRUPTION IN THE WAY TO BEHAVIORS OF THE USER TO BRING ATTENTION TO PRODUCT CARE.

**Possible directions to think in:**

**The product takes initiative**  
How can your design take the first step of product care? Try to push the user to perform the product care activity.

**The product handles product care itself**  
How can your design update or fix itself? Can your design ensure that the user does not need to perform?

**Unconscious takeover**  
How can your design fit an act of product care into the user's daily habits or routines? How can the design, unconsciously, make the user want to perform product care? Try to make the user unconsciously perform product care.

**Forcing product care**  
How would your design force the user to perform product care? Or can your design refuse to work if product care is not performed?

**CONTROL**

**Possible directions to think in:**

**Personalization**  
How can your design provide the user with the possibility to alter their product before/after purchase? Try to see how you can make the user alter the design so it fits their personality and identity better.

**Ever-changeable products**  
How can your design be altered during the use-phase? How can your design adjust themselves to the changing needs of the user?

**Creative change**  
How can your design trigger the user to tap into their creative side? Try to inspire and enable the user to appropriate the design.

**APPROPRIATION**

**DESIGN STRATEGY**  
**CONTROL**



THINK ABOUT IF YOUR DESIGN PLAYED THE DOMINANT ROLE IN THE RELATIONSHIP. IF IT WOULD MAKE DECISIONS ITSELF. STEER THE USER UNCONSCIOUSLY OR EVEN FORCE THE USER TO PERFORM PRODUCT CARE.

**DESIGN STRATEGY**  
**APPROPRIATION**



THINK ABOUT CREATING APPROPRIATION POSSIBILITIES FOR THE USER. BY PROVIDING PERSONALIZATION POSSIBILITIES, CHANGEABLE PRODUCTS OR STIMULATING THE USER'S CREATIVITY.

Possible directions to think in:

**Static info**  
What forms of traditional information can heighten the knowledge of the user? Try to support the user with manuals or tutorials to perform product care.

**Interactive info**  
What forms of interactive information can heighten the knowledge of the user? Try to make sure the information evolves according to what the user wants or needs to know.

**Physical information**  
How can your design explain what kind of product care would be necessary through its form? Try to use affordances in your design to explain or stimulate the act of product care.

INFORMING

Possible directions to think in:

**Meaningful memories**  
How can you make your design evoke, represent or stimulate making memories? How can you connect personal meaning to your design? Try to stimulate product care by making the user feel an emotional connection or attachment to your design.

**Traces**  
How can your design tell a story? How can your design show beauty in the wear or traces of use of your design? Try to make the user reflect on the meaning of those traces and the user's relation with your design.

REFLECTING

Possible directions to think in:

**Social connections as a result of product care**  
How can your design evoke social connections or interactions? How can your design make social activities part of product care activities? Try to see how the act of product care can lead to social interactions between your user and other people.

**Social connections as a facilitator for product care**  
How can your design make social connections or interactions support the act of performing product care? Try to see how you can use the social connections the user has (or could have).

SOCIAL

DESIGN STRATEGY  
INFORMING



THINK ABOUT HOW YOU CAN HEIGHTEN THE KNOWLEDGE OF THE USER, THROUGH TRADITIONAL FORMS OF INFORMATION, THROUGH INTERACTIVE SOURCES OF INFORMATION AND THROUGH INFORMATION HIDDEN IN YOUR DESIGN.

DESIGN STRATEGY  
REFLECTING



THINK ABOUT HOW TO MAKE THE USER REFLECT ON WHAT VALUE A DESIGN HAS TO THEM, THROUGH THE MEANING OF THE DESIGN OR THE MEMORIES OR STORIES THEY CONTAIN.

DESIGN STRATEGY  
SOCIAL



THINK ABOUT MAKING USE OF THE USER'S SOCIAL CONNECTIONS AS A RESULT OR AS THE FACILITATOR OF PRODUCT CARE.





