STIMULATING CONSUMERS
TO EXCLUSIVELY PURCHASE PRODUCTS
OF LONG-TERM PSYCHOLOGICAL VALUE

EVELINE BEUKERS - GRADUATION THESIS - OCTOBER 2019 - TU DELFT

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PREFACE

This thesis has brought me the confidence that I am able to conduct my own research. It has made me realise that I love to do research and design for a better world. However, there are a lot of people who I have to thank for making this project possible this way.

First, I want to thank my TU Delft mentors: Mieke, Ruth and Renkse. You were enthusiastic about my ideas and supported the approach. Even if these ideas were counterintuitive to the foundations of this faculty: more versus less products. You have asked the right critical questions and you made sure I dodged the trap of a negative approach on consumerism. The meetings were very pleasant and it gave me lots of energy.

This project is the result of endless prototype testing and iterations. I want to thank everybody who wanted to join me for testing from the king's day flea market until the participating of the validation test. And of course I want to thank everybody who has played the game to make all these iterations possible. The ideation was also very welcomed and therefore I am grateful for people who contributed to the session, and the little inspiring and critical talks in between. I should not forget the actors of the movie who have shined in making the designs comprehensible for a bigger audience.

Then there is my biggest enemy of this project: all the written communication. Thank you Hans for your Socratic approach on the structure of this report. And I want to thank my army of grammar experts to turn my thoughts into a comprehensible pleasant story: Ike, Zoë, Koen, Mark, Bernice, David, Froukje, Max and my parents.

A large boost to my motivation was the enormous amount of cookies, coffee and company of the Squad and the newly developed weekly sportive routine with the #Fitgirls.

And last of all, I want to thank Ike for being the inspiration of this project. Your view on products and belongings has changed my view too. I hope soon it will change a lot more views.

ABSTRACT

In the last decade, an increasing amount of people has become aware of the negative impact their behaviour has on the environment. However, most consumers are not aware of the negative environmental impact of the products they purchase and possess. Research has been done on different aspects of products for a circular economy, such as product longevity, and on the purchase process but mostly for marketing reasons instead of sustainability. Research has also been done on the gap between intention and behaviour of sustainability minded people. This research presents barriers, but no research was found on translating these barriers into solutions. Little was found in literature about making appropriate sustainable buying decisions.

The main objective of this thesis is to stimulate consumers to exclusively purchase products with long-term psychological value, with the ultimate goal of reducing the ecological footprint of the consumers. In the first part of this research the characteristics of personal long-term value of products are identified. Data for this study is obtained through ten in-depth interviews and literature review. The second part of this research aims to identify how the purchase behaviour could be changed and which factors influence the purchase behaviour. This part contains a literature review and utilises the research through design method, in which five different prototypes are tested. The third part of this thesis translates this new theory into practice. Three new prototypes are developed, which should together affect the change in purchase behaviour. These products are validated with five participants over three weeks.

The results of the interviews show three categories of psychological long-term product value: products that carry memories, products that satisfy basic

needs and products which enable human goals. These last two categories complement each other. The research on behavioural change shows that the human goals should be discovered first, which results in a personal set of long-term product values. Next, consumers have to be reminded of their values during the purchase process. Finally, sufficient commitment should be created to resist the products that do not fit the personal set of long-term product values. For this, a game is proposed to raise awareness and discover this personal set of long-term product values. This game enables the consumer to train the reasoning behind the desire for products. The validation test showed that the game is successful in creating awareness and in training consumers to reason about products with personal long-term product value. To make the consumer remember their set of personal long-term product values in the purchase process, two reminders are proposed: the 'Product Calendar', and a sticker set 'Stick to your values'. These designs remind the consumer of their long-term product values, translate the game into real life and create commitment. In conclusion, this project enables designers to understand long-term psychological product value, gives them a framework to design for purchase behavioural change, and the designs of this project enable consumers to make more sustainable purchase decisions.

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DESIGNS FOR BEHAVIOURAL CHANGE

DISCUSSION & RECOMMENDATIONS

INTRODUCTION

This project is about stimulating consumers to exclusively purchase products with long-term psychological product value. This chapter will start with an explanation of the negative environmental impact of products. Then, research is explored about products and sustainability. There is a gap in research about how to stimulate sustainable purchase decisions. Subsequently, it is reasoned that stimulating consumers to make sustainable purchase decisions might have additional impact in the transition to a more sustainable world. Then, four factors are identified which have stimulated consumers to buy (more) products in the last century. This project will focus on a part of one of these categories: the psychological side of premature obsolescence. Finally, the structure of the report is explained.

Environmental Impact of Products

The environmental impact of humans on the earth is growing with our linear economy: resources are taken from the earth, used and discarded. The ecological footprint is a model proposed by Wackernagel & Rees (1996) to indicate the earth's capacity to support human activities. For the Netherlands, the ecological footprint per person was 4,9 global hectares in 2016 (see figure 1). This means that the average Dutch citizens are demanding three times the resources and wastes that our planet can generate or absorb.

In addition to the ecological footprint, Porcelijn (2016) shows in her book 'The Hidden Impact', that a lot of impact is not seen or realised by the consumers. In a rough estimation based on the ReCiPe model, she shows the real impact. The ReCiPe model is a method for the impact assessment in the life cycle analysis. The first impact factor is the direct emission of greenhouse gases, like the CO_2 emission during the use. The other three factors are the hidden emission of greenhouse gases, the diverse environmental pollution and, the agriculture and deforestation. We often don't realise the last three impact factors of products, because most of the impact of the resources and manufacturing occur abroad. In figure 2 the graph made by CE Delft, commissioned by Porcelijn, is shown with different indications about the impact on the environment. Usage goods (electronics, toys, furniture, vacuum cleaners, paper etc.) have the largest impact. Especially the more complex products with a lot of different materials like mobile phones have a lot of impact, unlike for example a rubber duck. Therefore, this project will focus on the usage goods category.

| > 6.7 gha | 5.1 - 6.7 gha | 3.4 - 5.1 gha | 1.7 - 3.4 gha | < 1.7 gha |
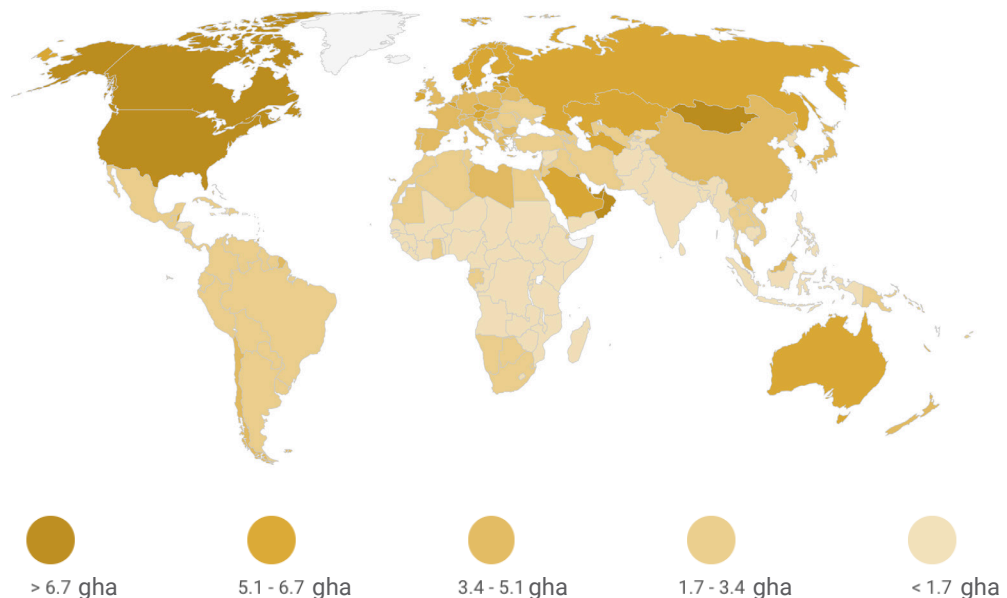
Figure 1.   The ecological footprint per person in an overview of the world in global hectare, gha. (footprintnetwork, 2016)
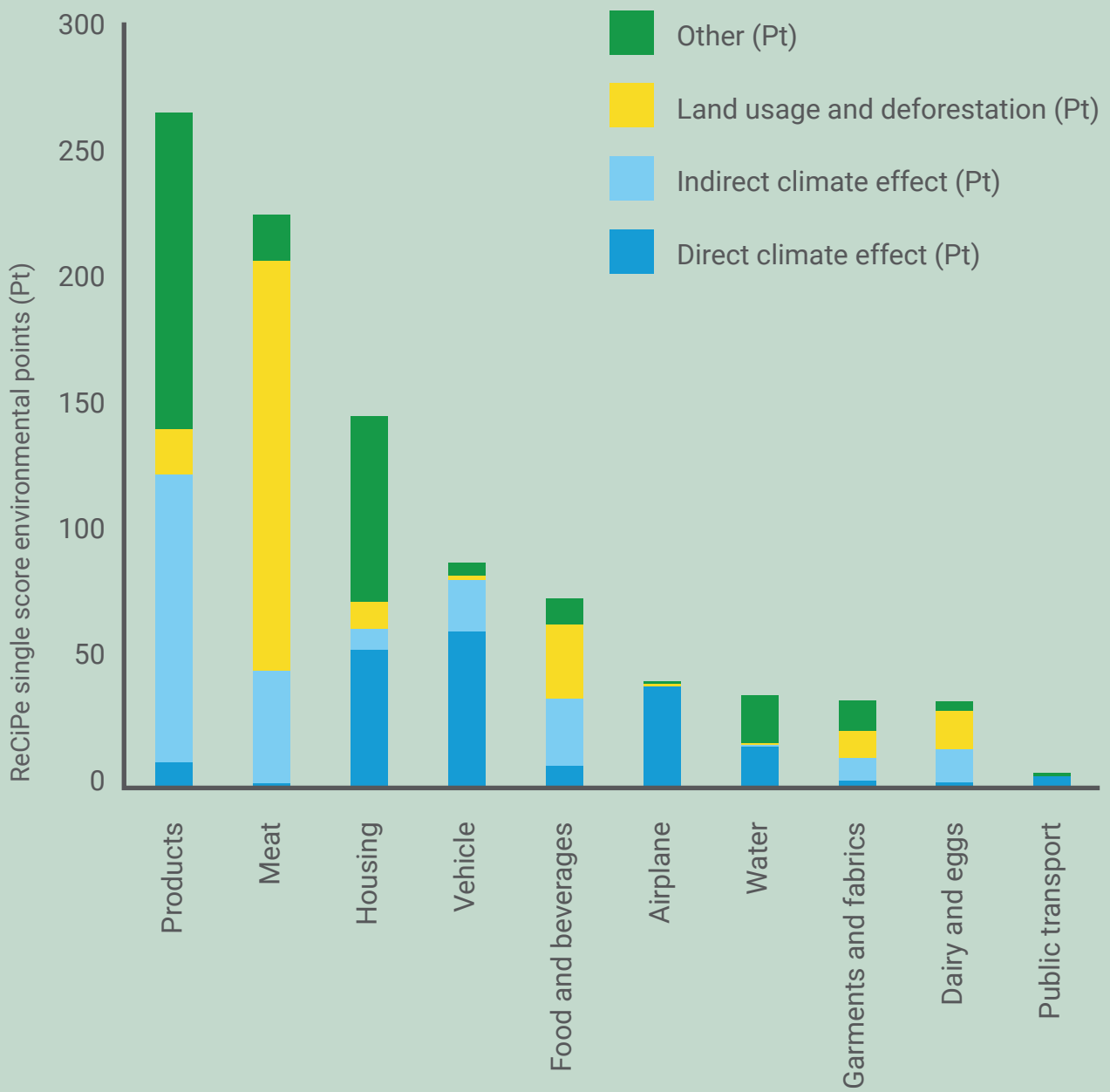
Figure 2. The impact of different categories for an average Dutch citizen (Porcelijn, 2016).

Biological nutrients

Biosphere

Restoration

Biogas

Anaerobic digestion/composting

Extraction of biochemical feedstock[2]

Farming/collection[1]

Biochemical feedstock

Cascades

Consumer

Collection

Mining/materials manufacturing

Parts manufacturer

Product manufacturer

Service provider

User

Collection

Technical nutrients

Recycle

Refurbish/remanufacture

Reuse/redistribute

Maintenance

Energy recovery

Landfill

Leakage to be minimised

1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input
Source: Ellen MacArthur Foundation circular economy team

Figure 3.   The butterfly diagram of the EllenMacArthur Foundation (2012) representing the circular economy. The smaller the loop the less energy is used for reusing the raw materials.

Products and Sustainability

Since the report of Our Common Future in 1987, there are different schools of thought about changing society to live within our boundaries. Almost all of these movements are advocating circular economy, where materials and energy are preserved instead of discarded like in a linear economy. In figure 3 the circular economy butterfly diagram of the MacArthur Foundation (2012) is shown. The left side shows the natural loop with biological nutrients and the right side the technical nutrients. The smaller the loop, the less energy is needed to reuse the materials. Therefore, the loop has to be minimised in sustainability projects.
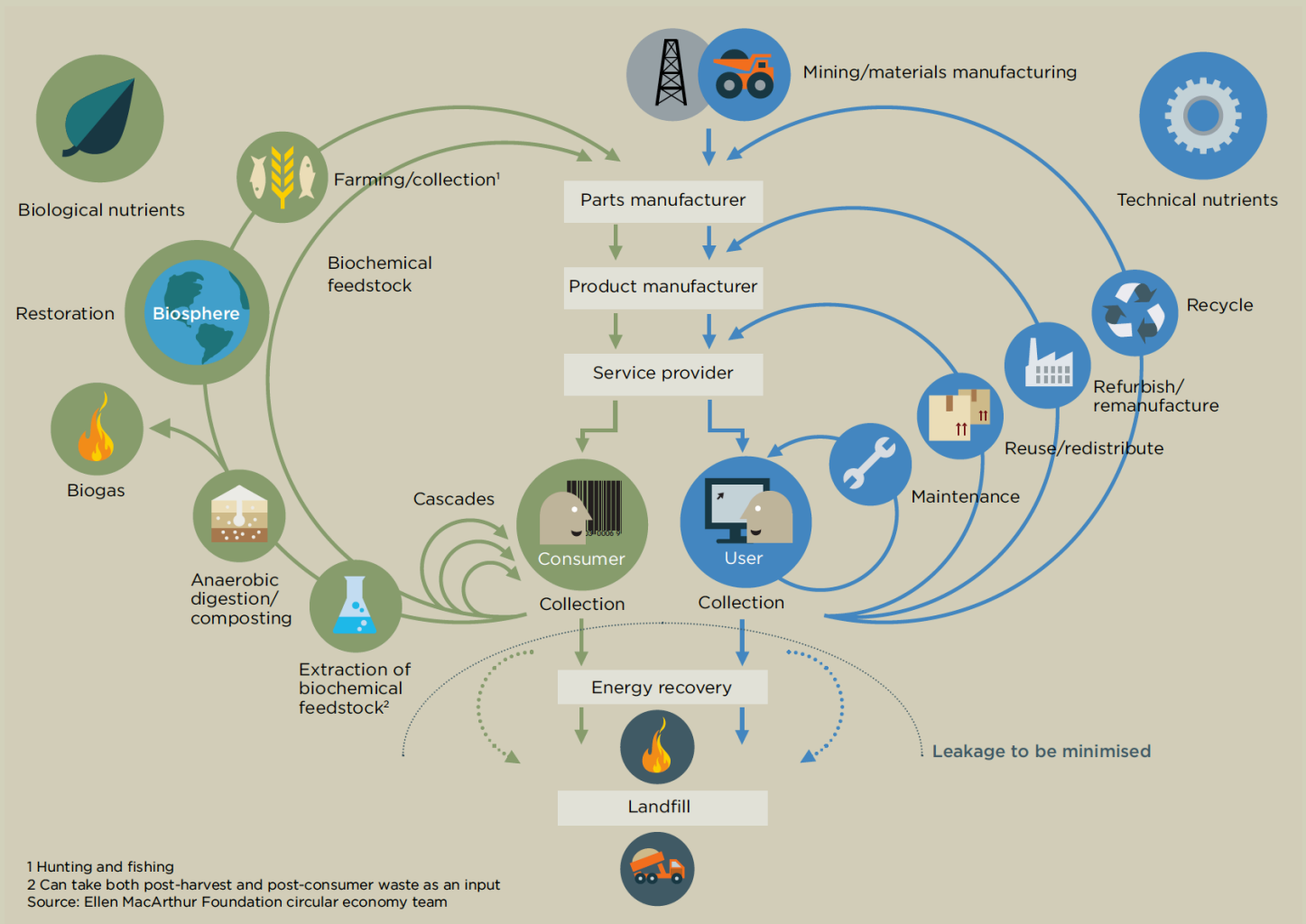
Product longevity is focused on the inner circles of the butterfly diagram, where the least energy is needed. Product longevity is about product lifetime extension by repairing (Cooper & Salvia 2018) and reusing (Cole et al., 2017). It is also possible to extend lifetime through emotional durability by encouraging product attachment (Chapman, 2015). Another way of increasing product longevity is by designing for adaptability/upgradability (Nes & Cramer, 2005 and Bocken et al. 2014). These systems increase frequency of use by renting, leasing or sharing which contributes to sustainable consumption as well. All these sustainability studies to product longevity are focused on the prolongation of products lifetime. However, to raise motivation to repair products, it should be valuable enough in the long-term. Otherwise, the product is easily replaced or is superannuated without using its full potential. There are not many studies about a sustainable buying process.

Most research on consumer behaviour and the purchase process in particular, highlights the marketing aspects. This is quite logical, since the industry has a lot of interest in the marketing side of consumer purchase behaviour. The influence of different factors like advertising, purchase decision, consumption and product involvement are researched (Cass, 2000). Another aspect of product purchase research is the intention behaviour gap. Carrington, Neville & Whitwell (2010) studied the intention behaviour gap of environmentally minded people. This phenomena is that people have some specific intentions, but at the moment of purchase they show a different behaviour than their intentions would predict. Young, Hwang, McDonald, & Oates (2010) say that the effort and time required should decrease to make sustainable consumer behaviour more accessible. Gnanapragasam et al., (2018) defined consumer motivations and intentions in environmental purchase decisions. He also stated that further research is needed how the purchase sustainable intentions of consumers can be translated into behavioural change.

To conclude, research has been done on different aspects of the circular economy, e.g. product longevity. But the purchase phase is mostly researched for marketing reasons instead of sustainability. The other thing researched

is the behaviour intention gap of sustainability minded people. The barriers are presented, but no research was found on translating these barriers into solutions. Gnanapragasam says that more research is needed to translate the sustainable purchase intentions into behaviour.

Consumer vs Industry

Another aspect of sustainable consumption is the stakeholders in the purchase phase. Sustainable consumption can be initiated from the business side or from the consumer side. Many sustainability design movements have a focus on how one can design products which push consumers toward a more sustainable way of consuming. This can be done by improving product longevity or making energy/material saving products/systems. There is a small group of businesses which focuses on this sustainability aspect. For example, Fairphone produces a phone with a long-lasting design and easy repairs and maintenance. Other businesses see the sustainability aspect as a side project. Like IKEA who is switching to sustainable produced cotton and energy efficient LED. However, there will always remain a large group of businesses who just want to make profit and thus optimise their sales numbers. An increasing number of businesses are pushing towards sustainable consumer behaviour, but I think that we can make the transition much faster and wider if we also pull from the consumer side and use the supply and demand mechanism.

If we enable consumers to make the sustainable consumer decision simpler and more attractive, we can have impact on at least two factors. One side is only owning products which's full potential value will be used. For example, when somebody owns a house full of sustainable products, but does not use them, it is not sustainable consumer behaviour. The other factor is provoking businesses to make products with the potency to have long-term value. In other words, this motivates them to minimise the premature obsolescence in their products.

Reasons to Buy Products

If we focus on the purchase of products by a consumer, the question arises: why do people buy so many products? Different civilisations in the time of human history have always made and bought products. However, our definition of consumerism is best understood with the beginning of the industrial revolution: "Consumerism is a social and economic order and ideology that encourages the acquisition of goods and services in ever-increasing amounts". Mahajan (2015) These 'ever increasing amounts' are an interesting phenomenon to be further studied.

The industrial revolution brought great prosperity in Europe and America.

With the introduction of the factories, income gaps between the business owners and the working class grew. Because products were manufactured on large scale, they became available to a bigger audience. As time passed, the socialists values came up and a strong middle class emerged. This gave a boost to consumerism since this new class had access to better education, better housing and the ability to buy more luxury items (Rau & Oberhuber, 2016). When their basic needs were fulfilled with easy accessible products in this improved economic situation, people got the space and freedom to address their psychological and self-fulfilment needs (Maslow, 1943).

Consumerism was not only promoted by the introduction of the changing needs of consumers, it was also pushed by the introduction of marketing of desires, firstly introduced by Edward Bernays (The century of Self, BBC). During the first world war, Edward Bernays saw how propaganda was used to change the thoughts and beliefs of the mass. According to Bernays, this principle was not only useful during war, but also during peace time. He studied the psycho analysis theories of Sigmund Freud – his uncle – and used these for the first time as a tactic to manipulate the subconsciousness of the big American audience for commercial purposes. One of the first manifestations was a campaign for a big cigarette company which wanted women to start smoking. This was done by a big parade where some suffragettes lighted a cigarette on Bernays' signal. In advance he had informed the press that these suffragettes would join the parade. There was full press coverage of this historic moment. A smoking female became a symbol of independency instead of indecency. For the first time in history, products were connected with proposed self-identity without having a clear connection. From now on, marketing was more focused on the creation of a desire than the fulfilment of a need. *"The key to economic prosperity is the organised creation of dissatisfaction."* – Charles Kettering (former CEO of General Motors)

Besides the increased living standards and the marketing based on desires, there is another reason people buy ever increasing amounts of products. In order to sell an ever-increasing number of goods and have a flourishing economy, the lifespan of products should be reasonably short. This is where the term premature obsolescence comes in. One of the first known applications of this term is in the early twenties. Because of the mass production, the industry became concerned of a saturated market. The products were always of high quality and the machines made it possible to produce them in large numbers. There are different ways companies make sure consumers continue to buy their goods. Rau suggests that there are three ways of premature obsolescence: technical, functional and psychological.

The technical way is to make products with some parts of less quality, so after a set time the producer is sure that the product will break down. This could, for example, be done by using plastic for critical parts under a lot

of pressure. Software updates also fall under this category; some older processors might not be able to run updated software.

The second, the functional technique, makes sure that there is a product-successor in the market with added features: like unlocking your phone with fingerprint or extra space in the memory. Even if the old model still works, the new model is seen as more current and therefore a desire based on functionality is triggered to buy this new model.

The third technique pointed out by Rau is the psychological way of making use of trends and fashion. Once a fashionable image is created, everybody wants to live up to that image and will purchase the goods befitting this image. This is used in clothing fashion as well as the aesthetic appearance of for example cars or phones.

The last reason found for people to buy ever increasing amounts of products is the pleasure of buying. Since shopping became a leisure activity, the happiness of buying goods is subject to the hedonic treadmill. The hedonic treadmill is described by Brickmann and Campbell (1971) as the process, which is similar to scented adaptation, when people experience emotional events in life and adapt their happiness standard. Any positive emotional state reached, for instance when shopping, soon becomes the new standard. The same thing occurs when somebody smells something, but after a while the nose adapts and this smell becomes the new standard. To experience the same positive emotional state, a new purchase is needed to rise above the new standard. This psychological principle of the human emotions enforces the definition of consumerism by encouraging the acquisition of ever increasing amounts of goods. David Myers (1992) wrote in his book, The Pursuit of Happiness: *"The point cannot be overstated: Every desirable experience—passionate love, a spiritual high, the pleasure of a new possession, the exhilaration of success—is transitory"*.

Four types of trends and states initiates and enforce the throwaway culture and consumerism lifestyle in western society (see figure 4). The increased living standard is a slow development which is seen by most humans as progress. The hedonic treadmill is a given factor which is not really changeable, but an effort can be made in making happiness of consumers less dependent on buying products. The marketing based on desires is something the marketeers should change. The psychological side of premature obsolescence has the most potential of changing the consumerism and will therefore be the focus of this project.
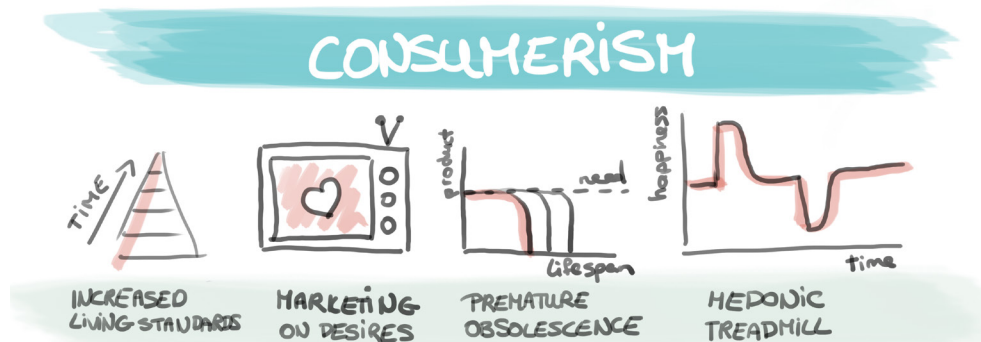
Figure 4.   Four factors noticed which encourage or maintain the consumerism in society.

Project Structure

This thesis consists of three different studies. These studies are presented in the timeline in figure 5. The studies have not been chronological performed but do influence each other. These influences are drawn with the white arrows. The goal of this project is to stimulate the consumer to exclusively purchase products of psychological long-term value. In order to reach this goal, different steps are taken.

Firstly, the long-term psychological product value model is determined. This model is the extension of the existing ideas of factors determining the lifespans of products. The model is based on ten in-depth interviews. The model how consumers can exclusively purchase products which are still valuable in five to fifty years' time. This means that they still use the product, do not want to buy a replacement and that they are motivated to repair it if it breaks down.

In the second chapter the framework of consumer behaviour change is presented. This framework is proposed to indicate which aspects should be present in the design to change the consumers purchase behaviour. It is the result of the research through design method. The research through design method is the common core of designerly activities in the field of research. Prototypes are often used in these designerly activities to reflect, measure, discuss and analyse their effects in the real world. This approach is chosen because of the complexity of behavioural change. The prototypes used in the research are solutions for the preliminary problem statement posed in the

LONG-TERM
PSYCHOLOGICAL
PRODUCT VALUE

BEHAVIOURAL CHANGE

DESIGNS FOR
BEHAVIOURAL CHANGE

Literature research Lifespans

Interviews

Research through design

Literature research behavioural change

1. #MijnSpullen

2. Shopbuddy

3. Card set

4. Value guide

5. Key Ring decision

Ideation session

Framework

Long-term value model

Preliminary problem
definition

Life cycle

Personas

Problem definition

7 Design criteria

Game iterations

Trigger iterations

Final designs

Validation

Interviews

Analysis &
conclusions

Validation of the long-term
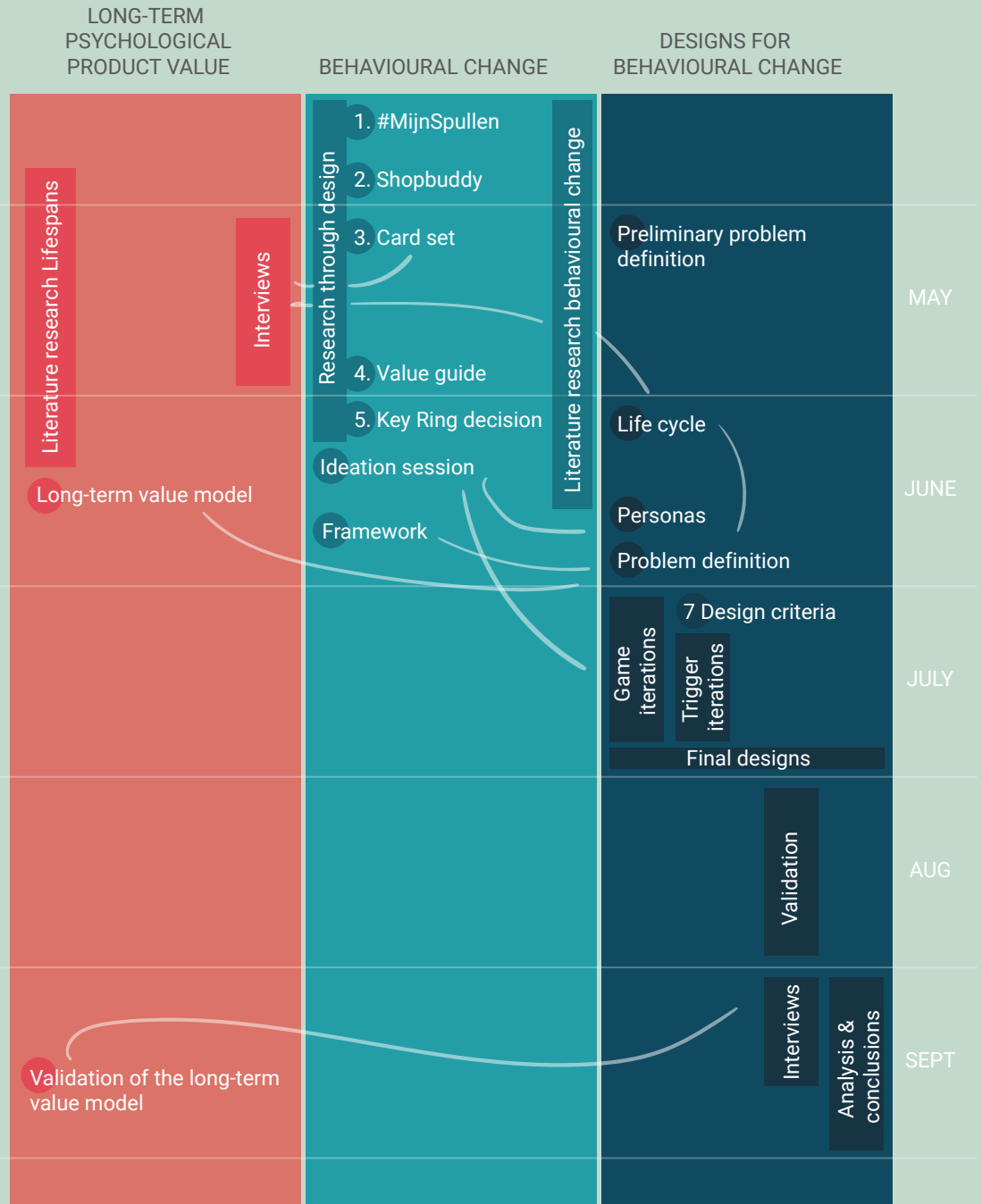value model

MAY

JUNE

JULY

AUG

SEPT

Figure 5.   Process of the project represented in a timeline. Influences are indicated with white lines.

beginning of the chapter.

The third chapter is about a final design for behavioural change. The enabling of human goals of the long-term psychological product value model is applied to the framework. After a set of iterations, three designs are presented. These three designs all fulfil a role in the solution for the final problem statement and together cover all the seven design criteria posed in the begin of this chapter. Firstly, there is the game: 'The Only Three Products I Need in Life'. This game provides the possibility of discovering which personal set of long-term product values the consumer has and facilitates to practice reasoning about products. Secondly, there is the 'Product Calendar'. This calendar reminds the users of their personal long-term product values at a quite reflective moment. Finally, there is the design: 'Stick to Your Values'. These stickers give the possibility for the consumer to translate the insights of the game into real life and to create commitment. With a validation test of three weeks with the target audience, recommendations and conclusions are made.

In the last chapter, all the main outcomes of the previous chapters are discussed. Also, recommendations are made for further research.

PSYCHOLOGICAL LONG-TERM PRODUCT VALUE

In the introduction the four factors which lead to consumerism were explained. The psychological lifespan of premature obsolescence is seen as the most promising factor to generate impact. To research this psychological lifespan, this chapter starts with examining the existing theories of product lifespans. Then the interviewing method is explained to research the long-term psychological product value. In the third section the results are presented and this chapter concludes with the proposal of the long-term psychological product value model.

EXISTING PRODUCT LIFESPAN THEORIES

This section starts with the method for literature research. Next the existing theories of lifespans are reviewed. In the last section the idea about products as enablers is explained.

Literature Research Lifespan

To gather more information on the topic of product lifespans, the main literature research question was: What are the existing theories about product lifespan?

Literature has been gathered on Google and Google Scholar in the field of product lifespans. The source list of the found papers was also reviewed to explore more literature. In addition, the books Cradle to Cradle (Braungart & McDonough, 2007) and Material Matters (Rau & Oberhuber, 2016) were read. These were recommended by people with affinity for the sustainability subject.

Product Lifespan

Two models of product lifespan were found in literature. Three product lifespans are defined by Van Hinte, Muis, & Odding (1993) and the actual product lifespan runs out as soon as one of these three fail. These three lifespans are the technical, economical and psychological lifespan (see figure 6). These product lifespans are about product longevity.

	Product Qualities	Situational Factors	Psychological Characters
Technical Lifespan	Reliability Durability	Climate Use	Character (caring vs rude)
Economical lifespan	Initial cost Cost of repair Upgradability Innovation	Economy Taxes VAT Finance	Level of risk tolerance
Psychological Lifespan	Ages, size, style, colour, features, adaptability, dignity.	Fashion changes storage spaces	Taste, mood

Figure 6.   Factors determining the lifespan of products by Van Hint, Muis en Odding (1993).

Rau & Oberhuber (2016) suggest three slightly different lifespans where the second lifespan is not economical but functional. An example of this functional lifespan is the functionalities added to a phone that stimulate people to buy the updated version. This kind of lifespan is also enabling fast electronic innovations.

The technical and economical lifespan are highly dependent on the producers, but can also be considered by the consumer when purchasing goods. Reliability and durability are product qualities determining the technical lifespan. Both can be captured by a good quality of materials and manufacturing. The situational factors are the way of using the product and the type of climate the product is used in.

The economical lifespan is dependent on the initial cost, the cost of repair and the upgradeability. The last factor is the adaptability of, for example, technological innovation. Situational factors on the economical lifespan are the influences of a country's economy. The psychological side of the economical lifespan is determined by the risk tolerance. The question is, would the user rather invest in something more rigid and new, or risk continuing to use an older product, which might fail?

The psychological lifespan is defined by both Rau and Van Hinte et al. as the change of fashion, trends, adaptability, taste, mood etc. However, I think that the psychological lifespan is too superficial explained by Rau and Van Hinte et al.. These factors explain why people replace a product, instead of store the product without using it anymore. Something might stay in fashion and have the right colours, but it is still not fitting the person's lifestyle. Therefore, I will research the psychological long-term product value with qualitative research in the next section.

Products as Enablers

The TurnToo model was developed by Rau & Oberhuber (2016). The TurnToo model promotes a new kind of product use where a consumer never buys a product, but only the service. For example the lightning service of Philips. The goal of the TurnToo model is to make products not goals, but change products into tools to enable humans to realise their dreams. This theory about products which enable goals instead of being a goal itself is an idea what is used in the development of the next sections.

MAIN TAKE-AWAYS

- The actual product lifespan is the minimum product lifetime among the technological, economical and the psychological lifespan.

- The psychological lifespan is focussing in literature only on the reason to replace products instead of the reason why products are not used at all after a while.

- Products can be considered as enablers of goals.

METHOD RESEARCHING LONG-TERM PSYCHOLOGICAL PRODUCT VALUE

The conclusion about the psychological lifespan in the previous section was that the existing theories only described the reasons why people wanted to replace their products. It did not describe the reason why the products were not used anymore. Interviews were done to explore this new theory. In this section the setup of the interviews to research the long-term psychological product value is presented.

The main research goal was to find the model that predicted long-term psychological product value. For this research ten in-depths interviews were conducted. This method was chosen because it allowed a broad discovery of people's values and a deeper understanding of people's motivations. The following sub goals were set: to get input for the personas and to have a better understanding of the consumer phases in life to define the target audience.

The participants have been gathered via Facebook, LinkedIn and WhatsApp. They were selected based on different stages of life (students, young professionals and middle aged singles/couples) and income (high, medium and low). One interviewer and one participant were present (one exception where two participants were present) and the visits lasted between one and three hours. The interviews were held at the home of the participant. The data was gathered through voice recordings and photos, and the voice recordings were transcribed and analysed afterwards. Spoken consent was given for the use of voice recording, the publication of anonymized written answers and the publication of anonymous photos.

The interview consisted of three parts: personal consumer information, product gathering and discussion, and categorising long-term product values (see appendix 1). Consumer information was obtained using a questionnaire with six Likert scaled items about consumer decision making styles, based on the questionnaire of Sproles & Kendall (1986) (appendix 2). There were eight factors to determine the consumer style. Sproles & Kendall suggested three to eight questions per factor, but this would take too much time to answer. All the questions had a weighting factor and two questions per

Figure 7. The human goal cardset. These were translated in Dutch after the pilot interviews; the original english explanation of the cardset of the Delft Institute of Positive Design is on the backside.

factor were selected based on a high weighting factor. For the third factor, a question was added about technical gadgets. This was done to make the consumer styles up to date, since they were composed in 1986.

The second part, product gathering, was introduced through several warming up questions about products. This was done to give the participant an idea of the objects that were of interest for the research, and to let the participant focus on his or her products. Afterwards, a tour around the participants' house was done, where the participants' products and reasons for purchasing were discussed.

The last part, categorising long-term product values, was supported by the twenty-two human goals of the card set of the Delft Institute of Positive Design (2017). In the pilot it was decided to leave the happiness and resource requirements out of the card set. These goals were too general and one could easily assign everything to them. This would undermine the idea of thinking critical about the reasons why the participant is happy with the product. The main words on the cards were translated in Dutch after the pilot. This is done because not all participants were fluent in English and this helped to understand the used terms (see figure 7). The English translation, pasted on the back, was used if the participants were still in doubt about the interpretation of the term.

- Belonging
- Bodily sensations
- Entertainment
- Exploration
- Equity
- Individuality
- Intellectual creativity
- Management
- Mastery
- Material gain
- Physical wellbeing
- Positive self-evaluation
- Resource provision
- Safety
- Self-determination
- Social responsibility
- Superiority
- Task creativity
- Tranquillity
- Transcendence
- Understanding
- Unity

MAIN TAKE-AWAY

- The psychological long-term product value was tested through ten in-depth interviews for a broad understanding of the consumers motivations and values.

RESULTS OF LONG-TERM PSYCHOLOGICAL VALUE RESEARCH

The interviews produced a wide range of qualitative information about the psychological lifespan of products. The insights were gathered, categorised, prioritised and are presented in this section.

The psychological lifespan was further researched through the interviews. From the interviews, three categories of products could be identified. All participants could explain the long-term value of specific products within these three categories (see appendix 4).

The first category which is discovered contained the products which enable us to function in everyday life. This was a very basic category which satisfy the basic needs at the bottom of the pyramid of Maslow (1943). Although participants indicated that these basic products were still meeting the quality and aesthetic standards of their lifestyle determined by the income and lifestyle of peers. However, when looking at what these products enabled, this shouldn't matter. Therefore these product upgrades should also be reasoned by consumers through the personal long-term product value.

The second category were the products that enabled human goals. The 22 of the 24 human goals of the Design for Happiness Deck of Desmet et al (2017) were considered in the interviews at the home visits. The products owned by people can become tools to enable these human goals instead of being a goal itself (Rau, 2016).

These first two categories were dependent on each other. There was no clean separation what people perceived as satisfiers of basic needs and what were enablers of human goals.

The last category were the products with memories attached. These products could be part of the other categories or stand-alone. There was a wide range in how strong and special the memories were, but the participants indicated that the products did keep their value over a longer period of time.

MAIN TAKE-AWAYS

- Three categories were distinguished in the personal set of long-term product values: satisfiers of basic needs, enablers of human goals and carriers of memories.

LONG-TERM PSYCHOLOGICAL PRODUCT VALUE MODEL

TO CONCLUDE, THE PSYCHOLOGICAL PRODUCT LIFESPAN COULD BE CATEGORISED IN THREE PARTS: PRODUCTS WHICH SATISFY BASIC NEEDS, PRODUCTS WHICH WERE ENABLERS OF HUMAN GOALS AND PRODUCTS WHICH WERE CARRYING MEMORIES.

The first category of products which enabled everyday functions in life did not describe a standard set of products. The more standard and basic a product was, the less one had to reason what kind of human goals were enabled by this product. In the long-term psychological product value model this coherence is presented (see figure 8). The basic needs were in every culture the same, but the set of human goals differed between each consumer.

An example of the personal long-term product value is presented in figure 9.
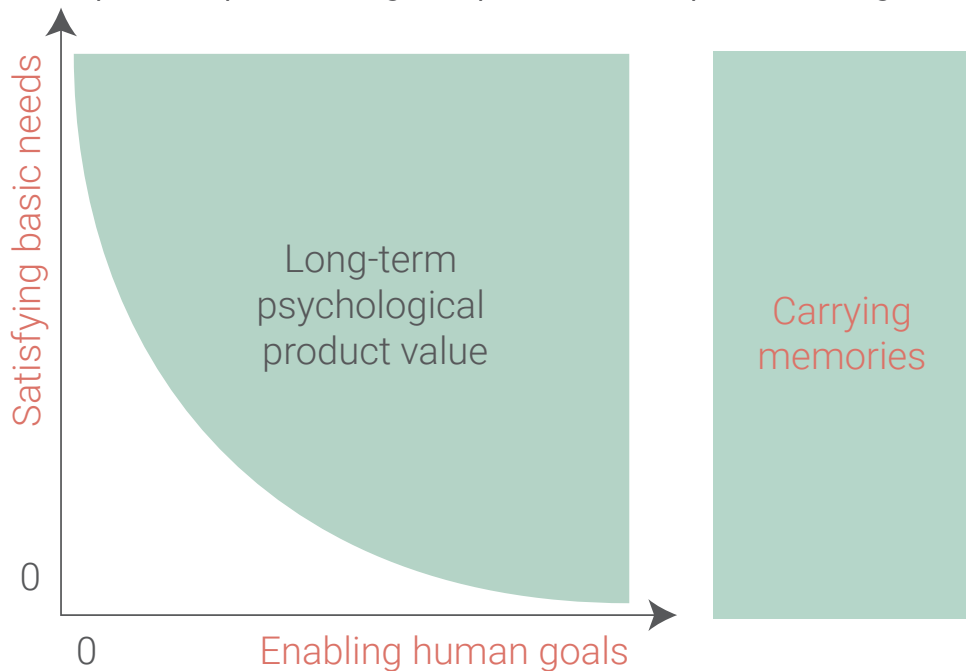

Figure 8. The long-term psychological product value model. On the y-axis the degree of satisfaction of basic needs and on the x-axis how much the product enables human goals. Next to this is the third category: products carrying memories. If the product is in the green area, it is most likely to have long-term value.
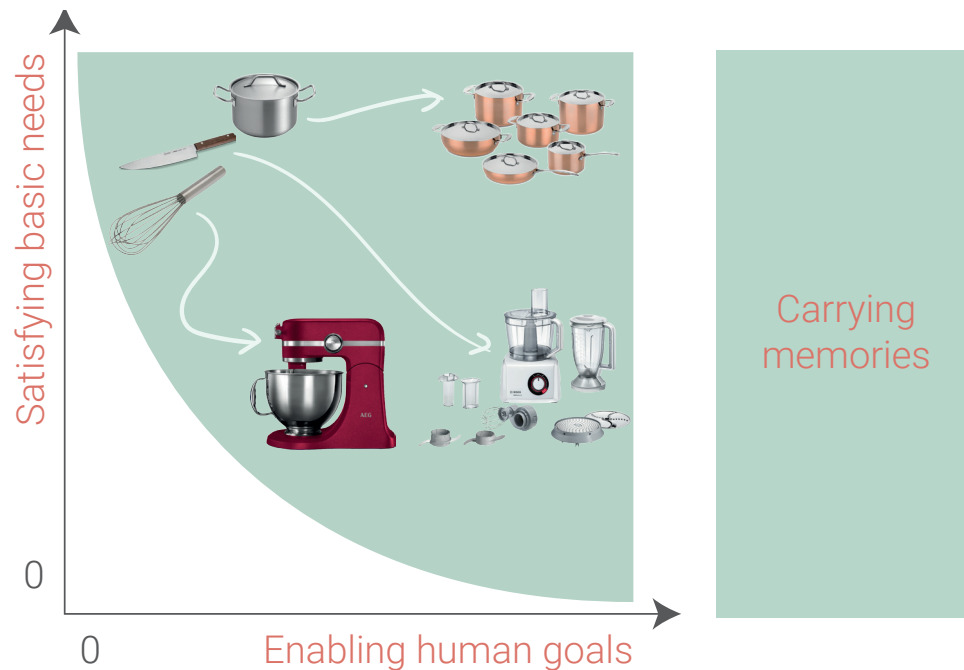
Figure 9.   Showcase of the long-term value model with several products.

In this example three products are shown with the possible upgrade. These upgrades are only of long-term psychological value if they enable one of the personal human goals of the (future) owner. Firstly there are the pots. If someone only cooks for him or herself, these pots are sufficient. However, if someone is an passionate chef who likes to cook for a lot of people, an extensive set of pots is useful. This set will be more likely to be intensively used in the next ten years. These pots replace the basic pot, so they are still satisfying basic needs, but also enable the human goals. The second object is the knife which can be upgraded to a food processor. The food processor would not be replacing the knife, but be additional. Therefore it is not a basic need anymore. However, somebody with the human goal of inviting a lot of people, but who is not so enthusiastic to cook, will use the food processor every time people come over. The last product in the example is the whisk. This whisk can be upgraded by a kitchen aid for people who like for example superiority and show of their kitchen.

Now the long-term psychological product value model is defined. This model characterises the products with long-term value. Designers can use this model to get a better understanding of long-term psychological value of products.

The interviews show that the enablers of human goals are the least known, but are important in answering the question: will a product still be used and valued in five to fifty years' time? For an example, see the case of the yoga mat on page 31. This case shows that not all people have the same set of long-term product values. Therefore, this project will focus on the category of enabling human goals.

MAIN TAKE-AWAYS

- Products which keep their value in the long-term should be strong in satisfying basic needs or in enabling human goals. There is one exception for products which are carrying memories.

- Products can be considered as enablers of human goals. Since this is least well-known, this will be the focus of this project.

- The set of human goals is often very personal. Thus, for each individual their unique set of goals has to be explored.

Problem Case of the Yoga mat

To explain the problem of buying products that do not fit your human goals, a case about a yoga mat is shown. This case is based on different aspects from the outcomes of the interviews.

Person A buys a yoga mat as a New Years resolution to do more sports. She uses it three times, but forgets about it because she figured in the end that she is not really a yoga person. This yoga mat ends up in the storage space without using the full potential of the mat. In addition to the value of the material thrown away, everytime person A sees this mat, the person will feel the burden of an intention which has never been followed up.

Person B buys a yoga mat and is very content with the mat. As a sporty person she uses the mat a couple times of weeks. After five years, the wear and tear is very noticable and person B is considering to buy a new mat.

The yoga mat is serving its real purpose much better for person B. Person A probably has an other purpose in life and is much better enabled to fulfill his or her goals with for example a surfplank or running shoes.

BEHAVIOURAL CHANGE

Changing the consumer behaviour is a very complex process. To achieve the main goal of the project, stimulate consumers to exclusively purchase long-term psychological value products, this chapter investigates how to change the consumer behaviour.

First, the existing theories of behavioural change are reviewed. In the second section, a preliminary problem definition is posed. To research how to design for behavioural change, the 'research through design' method was applied. This method is explained in the third section. The result of the research through design method is presented in section that follows. The results and the literature research together lead to a framework for consumer behavioural change. This framework is accompanied by all the main insights of the research through design. In the next chapter, the problem definition and list of requirements are revised and updated.

EXISTING THEORIES OF BEHAVIOURAL CHANGE

In this section the existing theories of behavioural change are reviewed. First the method is explained which was used for the literature research. in the second section the intention behaviour gap is explored. Then Fogg's behavioural change model is reviewed. In the section of psychology of persuasion and nudging, different theories are reviewed and the most promising are presented. To conclude the context of behavioural change and the literature about purchase stages is presented.

Literature Research of Behavioural Change

A general view on the problems in society and existing research of sustainability movements has been presented in the introduction. In order to change the impact of the consumer purchase behaviour can have, a more specific research was needed into this subject: behavioural change and the different kind of purchase processes.

A literature study has been conducted to assess how the consumer behaviour could be changed. This is done by using two sub questions: What kind of techniques of persuasion, nudging or marketing are known and useful for this project? And which kind purchase processes are distinguishable?

Literature has been gathered through Google and Google Scholar about the fields: Behavioural change and purchase processes. In addition, Influence (Cialdini, 2007) was read on recommendation of the Psychology and Persuasion lecture at the TU Delft.

Intention Behaviour Gap and Commitment

One of the reasons why it is so difficult for consumers to change their behaviour is the intention behaviour gap (Carrington, Neville, & Whitwell, 2010). This implies that even when people have sustainable intentions, they are not showing these sustainable intentions in their daily routine. For example when purchasing products. Gnanapragasam et al. (2018) shows in his research that most consumers do state that longevity and reliability are the two most important factors in their purchase decisions, however their

consumer behaviour does not reflect this.

However, Cialdini (1984) says that people like to act in the way they said they would. 'Once a stand has taken, there is a natural tendency to behave in ways that are stubbornly consistent with the stand.' Especially when the stand is visible to others. . The fact that one likes to look like a consistent person to others, motivates people to maintain this stand. Furthermore, when a commitment is made with a lot of effort, the person is more likely to act accordingly. That is why written commitments are more powerful than verbal ones.

Werff, Steg, & Keizer (2013) mention four values which play an important role in environmental behaviour: hedonic values, altruistic values, egoistic values and bio-spheric values. All of these values play a role, but they do vary in strength over countries, cultures, people and even in the moment of the day. These values determine self-identity, which determines preference, which determines intentions, which determines behaviour. These values can empower the commitment when the values become public. To conclude, the commitments are most effective in changing this self-image when they are active, public and effortful.

Fogg's Behavioural Change Model

In order to change behaviour and to overcome the intention behaviour gap, Fogg (2009) said that three elements are needed at the same time: motivation, ability and trigger. There are a lot of different behavioural change models, but Fogg's model gives a clear insight in the situation of decision making and is therefore very usable for this project.

For the aspect of motivation there are three main motivators, each with two sides. The first motivator is pain and pleasure which is the most direct of the three. It has everything to do with self-preservation and the propagation of our genes like sex and hunger. The second motivation according to Fogg is hope and fear. This motivator might be a bit less direct, but is sometimes more powerful than pain and pleasure. The last motivator is social acceptance and rejection. A lot of social behaviour is based on this motivator. This is due to the fact that out of a historical perspective we were always dependent on the group to survive. In addition, other and weaker factors that contribute to the level of motivation, such as the intentions coming from ones self-identity (Werff et al., 2013).

The second element is ability. According to Fogg, the best way to create ability for target behaviour is to make the behaviour simple. People don't want to learn new abilities, but they do love simplicity and saving effort. Scarce resources are often: time, money, physical effort, brain cycles, social deviance and non-routine. By determining the scarcest resource and changing

the corresponding barrier, it can make it easier. By taking away this barrier, people become better able to perform the target behaviour. Young, Hwang, McDonald, & Oates (2010) state that the two largest barriers in sustainable purchase decisions are the required effort and time. This means for this project that if a consumer should choose long-term value products, an easy method of assessing the long-term value of a product in the purchase phase is essential to decrease the brain cycles.

The last element of changing behaviour is the trigger according to Fogg: *"First, we notice the trigger. Second, we associate the trigger with a target behaviour. Third, the trigger happens when we are both motivated and able to perform the behaviour."*. The success of a trigger is greatly dependent on the right timing. The timing is right when the motivation and ability together rise above the behaviour activation threshold. Fogg describes three triggers: sparks which support the motivation, facilitators which highlight the simplicity and signals which serve as reminder.

Psychology of Persuasion and Nudging

People's behaviour and decisions can also be heavily influenced by techniques using the psychology of persuasion. According to Cialdini (1984) a lot of daily decisions are made on the automatic pilot. Most of the time, this rule of thumb works really well and saves a lot of energy. Marketers and other influencers try to exploit this automatic decision making. Van Lieren (2017) says that there are two ways to translate these principles into behavioural change interventions: rational overrides for reflective and slow thinking, and nudging for automatic fast thinking.

The first intervention is the checklist. Van Lieren describes this as: 'Simplify information or multi-step procedures into five to nine key steps in order to make it easy for people to remember and use.' A checklist of some small, easy questions might have more effect than asking one big, difficult question about the psychological long-term value.

The second intervention is the functional friction. Van Lieren describes this as 'Include small additional steps or actions in the process to disrupt mindless automatic interactions. People are asked to put in a little bit extra effort to get to their goal.' By disrupting the buying process or desire phase, the automatic and effortless buying behaviour might be interrupted.

The last intervention used in this chapter is the piggyback of routines. Van Lieren says that people are creatures of habit. The desired behaviour should be associated with an existing habit or routine. For example a moment in the day to think about the personal set of long-term psychological product values.

Purchase Stages

To design interventions for the purchase behaviour, an overview of the purchase phases is needed. Dewey (1910) determined five stages in the purchase process: a problem or a need, information search, alternatives comparison, purchasing decision and post purchase evaluation. The desire phase has the greatest influence potential for altering the shopping behaviour according to Kacen, Hess, & Walker (2012). These stages are used to make a customer journey with accompanying channels (see appendix 5) and are input for the prototypes which are explained in the results section of this chapter. The customer journey is the way to discover these usable channels, for instance to piggyback routines, and to see how the interventions fit in the habits of the consumer.

MAIN TAKE-AWAYS

- To change consumer behaviour, motivation, ability and know-how, and a trigger should be present at the same time.

- The sustainable consumer does state that product longevity and reliability are the two most important factors, but their consumer behaviour does not reflect this. The two main barriers of sustainable consumer behaviour are the required time and effort.

- Commitment can be used in the intervention to overcome the intention behaviour gap. Checklists are useful to decrease the brain cycles, functional friction can help to change existing habits and piggyback existing routines can lower the threshold to use the design.

- The five stages of the purchase process are: a problem or a need, information search, alternatives comparison, purchasing decision and post purchase evaluation. Most influence can be made before the purchase decision.

PRELIMINARY PROBLEM DEFINITION

A PRELIMINARY PROBLEM IS DEFINED TO CREATE A FRAMEWORK TO DESIGN FOR BEHAVIOUR CHANGE IN THE FIELD OF PURCHASING LONG-TERM VALUE PRODUCTS. IN ADDITION A LIST OF REQUIREMENTS AND DESIGN GOALS ARE POSED. THIS PROBLEM DEFINITION WITH THE LIST OF REQUIREMENTS AND DESIGN GOALS IS THE BASE OF THE RESEARCH THROUGH DESIGN IN THE NEXT SECTIONS.

Problem Definition

The world is in need of a way to decrease the ecological footprint and negative impact of humans on the environment. Consumers are at the heart of this impact, but change is not so easy due to some very logical and strong powers like the habituation of increased living standards, premature obsolescence, the hedonic treadmill and marketing based on desires, like explained in the introduction.

> *The environmentally minded consumer needs a way to make choosing long-term value products easier in the desire phase. This is because he or she wants to translate environmental intentions into sustainable consumer behaviour, but is hindered by the intention behaviour gap.*

List of Requirements

For the creation of the prototypes, the following list of requirements is composed. This list forms the scope of the solution space.

Set of boundaries for all prototypes
- The design should facilitate to prolongate one of the lifespans of premature obsolescence.
- The design should be a tool for the consumer.
- The design should focus on usage goods (like electronics, toys, furniture, vacuum cleaners, paper etc.) because they have the most negative environmental impact in the Netherlands.
- The end user should have a positive attitude towards the design.

Possible Design Goals

Based on the literature of the previous section, some possible design goals and solution directions were set up. Every prototype should focus on one or more design goals of the following list.

Possible design goals
- The design shows products as enablers of human goals. (Rau & Oberhuber, 2016)
- The design enables people to discover their own set of long-term product values.
- The design helps to overcome one of the two biggest barriers of sustainable consumption: the required effort and time. (Young et al., 2010)
- The design makes an attempt of helping people which have sustainability intentions, to translate these in the corresponding behaviour when purchasing usage goods. (Gnanapragasam et al., 2018)
- The design provides motivation, trigger and ability/ know-how. (Fogg, 2009)

RESEARCH THROUGH DESIGN METHOD

Changing purchase behaviour is a complex problem because a lot of factors have to be taken into account. This is almost impossible to solve with only literature reviews and deep thinking (Dorst, 2011). Therefore, the research through design approach was used in this project. In this section the theory of the 'research through design' approach is first introduced. Then, the goal of this approach for this project is posed. The bases of the prototypes are the theories of behavioural change, the preliminary problem definition and the list of requirements discussed in the previous sections.

Theory of Research through Design

According to Stappers & Giaccardi (2015) research through design is described as: 'The common core is that they advocate the contribution of designerly activities and qualities to the knowledge outcome, especially those activities that introduce prototypes into the world, and reflect, measure, discuss, and analyse the effect, sometimes the coming-into-being, of these artefacts.' Research through design is a well-known method of research in the fields of Human Computer Interaction and Interaction Design. The prototype is considered as one of the most important aspects of this method and are according to Stappers (2013):

- Unfinished, and open for experimentation
- A way to experience a future situation
- A way to connect abstract theories to experience
- A carrier for (interdisciplinary) discussions
- A prop to carry activities and tell stories
- A landmark for reference in the process of a project

The other important aspect of research through design is to write down the gained knowledge so it can be easily shared. The different artefacts that are made as prototypes and tested and described in this chapter.

Goal of Research through Design

In this project, the goal of the research through design was to get a clear view of different aspects which could contribute to the preliminary design goal (see page XXX). The prototypes did not have to cover the whole problem yet. The preliminary target audience for these prototypes were people who have

sustainable intentions, but do not show these intentions in their purchase behaviour. Every prototype in this project was tested via observation and questions to the participants. The research questions here were: What kind of techniques of persuasion, nudging or marketing are effective in a more considered buying decision for the target audience? And which moment of the buying journey is most effective to create the intervention?

MAIN TAKE-AWAYS

- The research through design method was used because the problem of changing purchase behaviour is a complex one. Parts of the solution could be discovered and tested in real life.

RESULTS

Five prototypes were developed to test for the research through design. In this section, the different prototypes and the insights of the tests are presented. These insights lead to the behavioural change framework in the next section.

#MijnSpullen

#MijnSpullen is a social media challenge to raise awareness about the impact of products (see figure 10). This is done through personal questions and the invitation to participate in the challenge. The main goal of the research was to get a better understanding of the context of people and products. A sub-goal was to create a discussion with people I interact with every day. Other sub-goals were to research which stage in the purchase phase had the most impact and to explore the solution domain on social media.

Theory and creation of the prototype

This first prototype is a social media campaign with questions that evoke reactions of people and let people reflect on their possessions. Positive and negative questions were asked to reach a broad range of product types and people. The medium of Instagram was chosen because people in my surrounding like to share photos on Instagram. Attractive trending colours, a big type font and a short question were chosen to provoke interactions. A little question in the corner was added to encourage people to not only share a photo, but also to tell the story behind the product. The #mijnspullen was chosen as a hashtag to gather all the photos and make sure that people could easily see the other photos. Six questions about products and people's attitude towards them were posed:

- Which product today makes you a happy person? How come?
- Which product did you rediscover this year? How did that happen?
- What would you rather lose than have in your closet, but is still there? Share your story!
- Which product did you almost buy, but in the end you didn't? Why didn't you buy in the end?
- What is your latest failed purchase? How come?
- Which product makes you a happy person every day? Tell your story!

Test

The social media campaign was the first prototype which was tested. The pictures were posted on Instagram with an account of hundred followers. Some people commented that they rather would help me by sending me
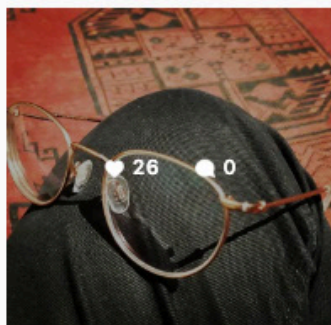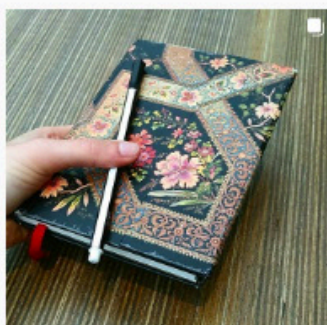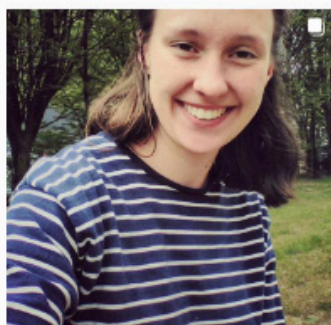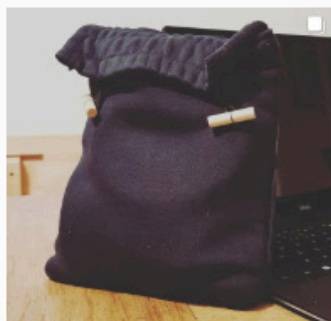
Figure 10.   The overview of the instagram page #mijnspullen with three questions and eight responses from other people.

pictures via WhatsApp than sharing them on Instagram. I send five different people the questions one by one via WhatsApp. Three questions were asked on Instagram. In total eleven different people reacted to them with twenty four products.

Results

- The participants were not so keen on sharing their stories of stuff with others via social media.
- People did like to read about other people's stuff.
- Participants found it hard to answer more introspective questions on a quick medium like Instagram.
- People wanted to help me, and posted it rather for this research than for themselves.
- People were curious about the posts and asked me in person what I was doing.
- External people did like the posts but nobody participated.
- There was no eagerness to write a lot of accompanying information along with the picture.

Long-term product value and behavioural change

The effect on the long-term value was not measurable, only an awareness about the topic is generated. Therefore a long-term behavioural change could appear. With the participation of this test, most likely people raised their environmental value a bit. The #mijnspullen was more reflective on the past than focusing on the next purchase.

INSIGHTS

- The depth of the direct questions should correspond with the channel used.

- People were eager to help, but the motivation of #mijnspullen was not big enough for strangers to participate.

- People found single direct questions about their stuff hard to answer.

Shopbuddy

The Shopbuddy is a wallet with questions about sustainability. The questions encourage the consumer to think critically about the sustainability of the product before purchasing it. This is done by making the money only appear if the questions are showed. The goal of the Shopbuddy was to test the moment in the customer journey and if the specific interaction with the product contribute to more environmentally minded purchase decisions.

Theory and creation of the prototype

The Shopbuddy was the result of an idea generation based on the customer journey, with the focus on the moment of purchase and the channel used was the wallet. The questions written on the wallet were based on the longevity characteristics of Van Hinte et al. (1993). This was based on the checklist rational override of the behavioural intervention toolkit of Van Lieren (2017). By answering them with yes, somebody could reach the money in the wallet. The wallet was also a piggyback on existing channels also based on the theory of Van Lieren.

Test

The Shopbuddy was tested on 27th of April 2019 at the flea market with two participants for each one hour. The first participant was using it almost as a map, putting the prototype in front of her. She remarked that there is too much text as we walked on the street towards the city centre. After a while she stated that she was not planning to buy anything.

The second participant putted the prototype in her bag right away. After a small hour walking on the flea market she was attracted by green pants. The trouser fitted and the participant was enthusiastic. That moment she took her purse and looked at the questions a bit agitated, she gentlemanly answered the questions. All the questions she answered with yes except one and she continued the purchasing. In the end she walked happily home (see figure 11).

Result

The moment of purchasing and taking the wallet was too late in the customer journey. Before taking the wallet, the choice was made to purchase the good. Therefore, the commitment was made and it took a lot of effort to reconsider the purchase decision. This confirmed the commitment and consistency principle of Cialdini (2007). In this test the theory was confirmed of Kacen et al. (2012) who suggested that the desire phase of impulse buying has the biggest influence. Another remark of the participant was that this wallet is not suitable in all situations, for example when buying groceries.
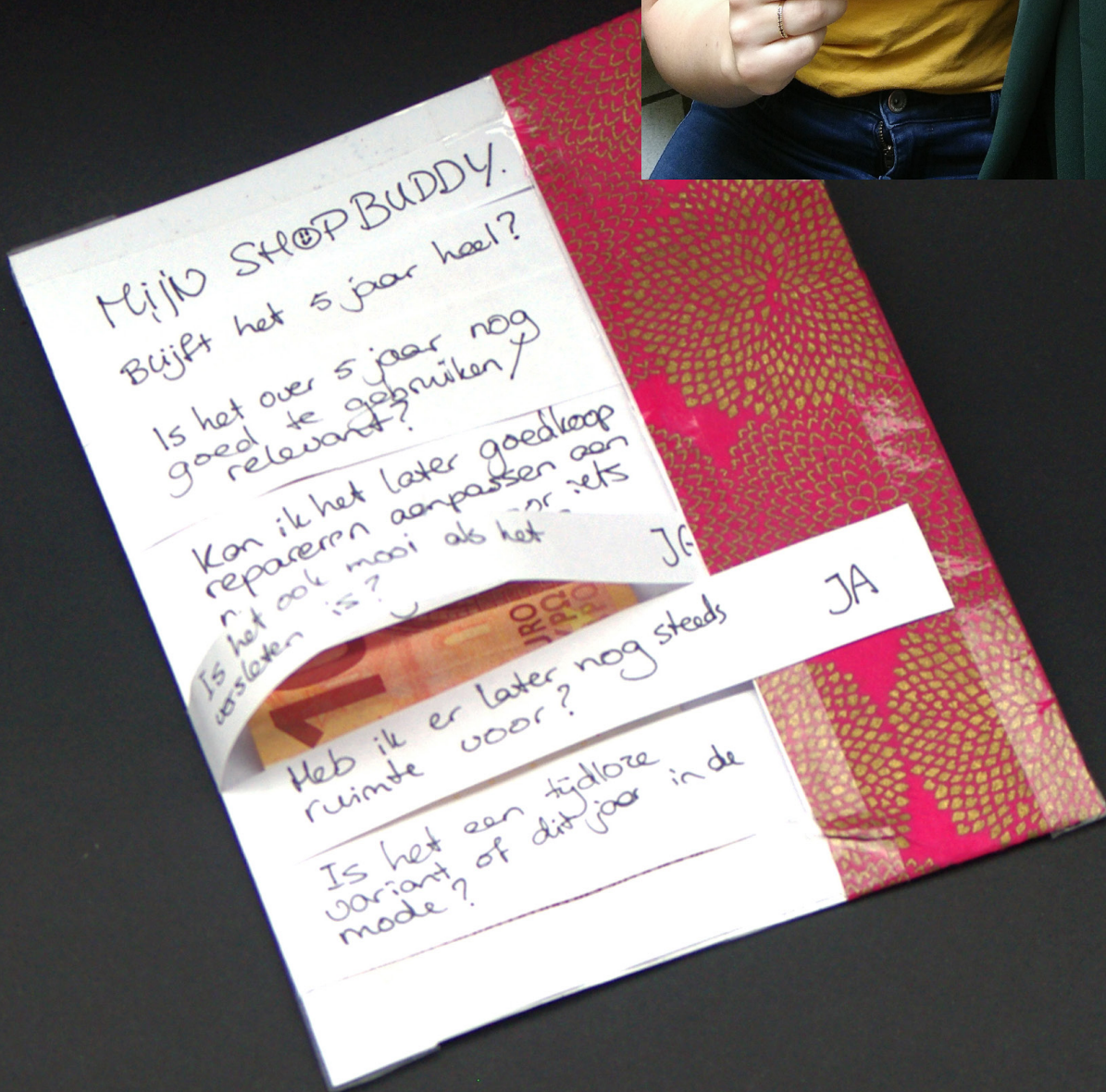
Figure 11.   The protoype of Mijn Shopbuddy and at the top the participant with the newly purchased green pants.

<u>Long-term product value and behavioural change</u>

Only half of the defined long-term value was covered via the questions: the technical and economical lifespan. Every time there was an interruption of the thoughtless paying action. So there was a reminder, but it was too late because the buying decision is already made. However, the Shopbuddy was a clear trigger and helped in the ability via the checklist.

INSIGHTS

- The awareness and choice should come prior to the purchase decision.

- Questions which are new and inspiring on the product contributed towards a positive attitude to the design.

- The use of too much text was not useful in a chaotic and hectic context.

Human Goal Card Set

The Human Goal Card Set is a card set with 22 human goals which enables the consumer to discover their personal set of human goals. By pick, sort and categorize the different cards based on someone's own possessions the personal set of human goals is discovered. The purpose of the Human Goal card set was to support the interviews for long-term product value and to discover if these human goals might be part of the definition for long-term value products. The card set became an important element in the interviews. It was not only helping me in sorting out the long-term value definition, but was also giving people a more clear image of their possessions and purchase decisions. Therefore, this card set was also treated as a prototype with insights as input for the behavioural change framework.

Theory and Creation of the Prototype

The Human Goal card set was used in the interviews to discover long-term product value. Rau (2016) described the products as enablers of human goals and the cards were used to explain the products as enablers of the personal human goals. The human goals were based on the card set of the Institute of Positive Design (2017). The cards were adjusted via translation in Dutch on the front of the cards together with the drawings. The further original English explanation was on the back. Everything was pasted on cardboard. These alternations were done after the two pilot tests with the original card set.

Testing the Human Goal Card Set

The Human Goal card set was tested eight times, with eight different participants during the interviews for the analysis phase. The cards were used for the last fifteen minutes of the interview. The interview had in total a duration of two hours. In this session, the interview was concluded by a personal set of human goals. I showed the cards one by one and the participants picked the ones they found interesting. After that I asked about the different products we had discussed in the interview. The products were connected to human goals and together with the participant the human goals were clustered (see figure 12).

Results
- Through observation it became apparent that people liked to easily adjust the cards by placing them on the table.
- Some people, typically females, choose a lot of cards. This made the whole process more time consuming and less transparent. Clustering was needed to get a clear view on their values.
- People had the tendency to pick cards according what they think is important instead of what gives them energy. Although a clear
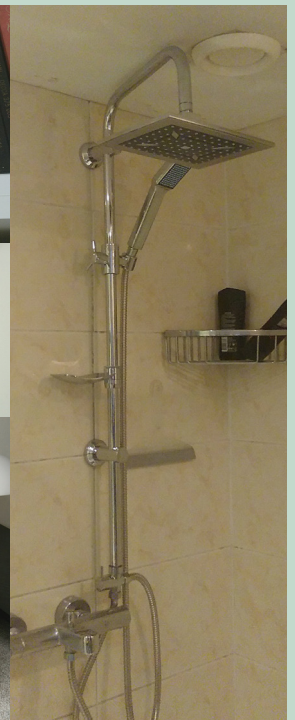
Figure 12. A personal set of human goals with the accompanying products for the human goals of task creativity, self-determination and bodily sensation.

instruction was given about picking cards which give energy.
- When talking about introspective subjects, a mother tongue translation was very welcomed by the participants. A further explanation in English was not a problem at all.
- The introspectiveness was received as very serious. Participants said that some more humour or a lighter and more playful approach would be helpful in motivating themselves to interact with the intervention.
- People went deep in their reasoning with the live discussion and critical questions.

Long-term product value and behavioural change

This intervention was only focused on the discovering of the individual long-term psychological product value. After a two-hour session the outcome was satisfying. However, there was still a challenge to compose a stand-alone session were the same results could be reached. The intervention was definitely adding to the ability in Fogg's behavioural model.

INSIGHTS

- Humour or a game could make the introspectiveness a bit lighter and more attractive to do.

- Live critical questions made people really dive into the subject and their own mind.

- The used language was important when talking about introspective topics. Translation to mother tongue helped to lower the threshold and to think out loud.

Key Ring Decision

The Key Ring Decision is a key chain with different labels which reminds the consumer of its personal long-term product values (see figure13). It is a checklist at an everyday used object: the keys. Key Ring Decision was an attempt to both cover the technical lifespan criteria and the psychological lifespan criteria. There were several tags attached to the key ring. The tags were representing all different aspects which should be considered while choosing for a long-term value product.

Theory and creation of the prototype

The design was a facilitating trigger (Fogg, 2009). The Shopbuddy had too much words for the chaotic environment. Therefore, the Key Ring Decision made only use of images and tactile sensations. A person often carries his keys with him, and when bored might fidget. It was very likely that people fidget with the keys or use them during the desire phase, where was the most impact (Kacen et al., 2012). Therefore, keys were chosen as an appropriate channel to target the desire phase. A commitment is created when wearing these tags in public (Cialdini, 1984). People choose to attach these tags to their keys and therefore they are likely to act consistent with their initial long-term value purchase intentions.

Testing the Key Ring Decision

The Key Ring Decision was tested on third of June in The Hague with one participant for one and a half day. The Key Ring Decision was introduced to the participant on the evening before the shopping day. With an earlier interview session, the values were determined and the personal key ring was composed in advance. In the evening before the shopping day we spoke about the different kind of tags and the aim of the research. She thought the sandpaper is more symbolic and nobody would scratch in the shop for real. The Key Ring Decision was considered to be attractive in form and experience. She was fidgeting with the tool during the whole conversation. The button and needles were attractive because they were real, but they also made the Key Ring Decision fragile.

At the beginning of the shopping day she changed the position of the Key Ring Decision from outside her bag to inside; she was so annoyed by the sound of the tags. Also, the appearance was too messy. She never took the Key Ring Decision out of her bag. However, she did talk more about the production country and type of used materials. During the day, nothing was bought for herself, only presents for others.

At the evaluation session she mentioned that she thought that shopping clothes is very different from shopping gadgets or household goods.

Figure 13.   Above: a participant after testing the Key Ring Decision, showing one of her human goals. Underneath a close up of the Key Ring Decision which was used for the test. This trigger is a nice checklist, but does not attract enough attention.

Because she indicated that clothes are not the things you really need. Therefore, she suggested to implement the question: if you really need it. She thought that, in the long-term, when all considerations are learned by heart, the Key Ring Decision would not be needed anymore. The tags with values were recognised as such and the division of the two types of long-term value were also discovered during the day. For all the tags she would suggest more humoristic symbols.

Long-term product value and behavioural change
The technical long-term value and the psychological logical were combined in the key ring decision. The test showed us that the Key Ring Decision initiated more awareness for the long-term value of both sides. However, there was no psychological value implementation observed while shopping. I believe that I was here the trigger in the purchasing decisions of this participant. The desire phase was a bit influenced because of the discussion about the prototype.

INSIGHTS

- Personalised humour was a good way to attract people to the prototype or to keep their attention.

- The trigger should attract attention. While walking, the noise of the prototype attracted attention but was also annoying what could lead to a negative attitude towards the prototype.

Personal Value Guide

The Personal Value Guide is a booklet which enables consumers to discover their personal set of long-term product values, through questions about their possessions (see figure 14). In order to get the right value tags in the Key Ring Decision design, it was important to discover these values first. In the interviews for the chapter of long-term psychological product value model, these values were determined in a two hour interview with an extensive discussion about the products in the house.

Theory and creation of the prototype

The personal value discover guide captured questions about the current situation of personal values like work, hobbies and a character description. This was also designed to be an easy first question to feel comfortable answering the questions. The next step was to get people in the right mind-set of thinking about their products. In the interviews it became clear that it was important to have a realistic image of their consumer behaviour via possessions and not only the idealistic image people can create of their own consumer behaviour. The next step was to go to the human goals of Delft Institute of Positive Design (2017). With the question of 'what gives you energy' the main motivations were found instead of an image people think other people find important. The last page of the booklet asked for owned products and here the goals got connected to these products. An overview of possible tags for the keys was presented by looking at a high score in happiness and marks at the goals.

Testing the Personal Value Guide

The Personal Value Guide was tested two times. One time on 29 may 2019 at the Technical University in Delft with a male student. The second time on the second of June in The Hague with two women; young professional and generation X.

In the first test it was not clear at the beginning what the goal of the guide was. An introduction in combination with the explanation Key Ring Decision was needed to make the relevance clear. The participant had a hard time in filling in the last page because almost everything he had bought he considered to be necessity of life. Finally he found three items which did fit in one of his two goals in life. The second page took the most time to fill in and he asked why the 'why' question here was so important.

In the second test, they both didn't expect this level of introspection and thought it was quite tiring to fill in. They both had a lot of values marked and they commented that they missed a scale to write if it was really important to them or just a little. The first woman said the plasticized pages were very
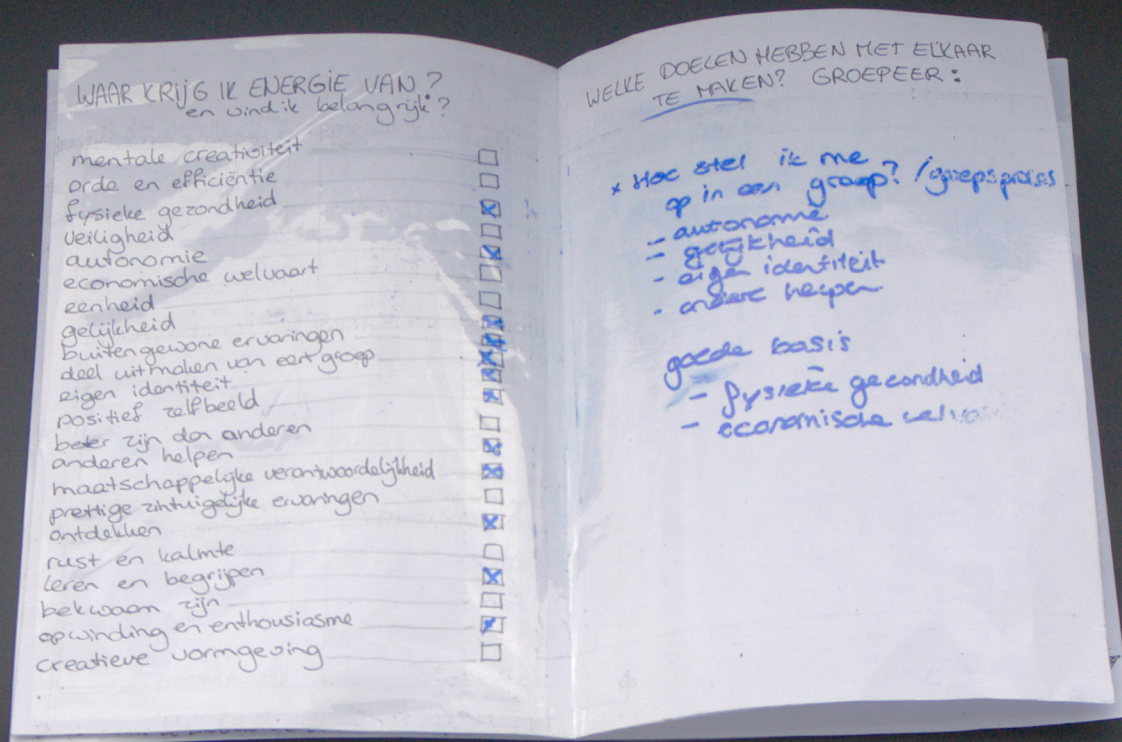
Figure 14. The personal value guide on the page of the human goals and the categorisation of these goals. This guide helps discover the human goals, but is too serious for such an introspective topic.

pleasant because she could give the booklet later to another person.

<u>Results</u>
- The grouping of the goals was difficult on plain white paper. Some more guidance was needed.
- A scale for the values would have allowed for a more considered value decision.
- Introspective topics were hard to fill in without any discussion with other people.
- The plasticized pages contributed to the reusable and therefore durable aspect of the product.

<u>Long-term product value and behavioural change</u>

In the design of the Personal Value Guide there was only the ability factor of behavioural change model present. It supports the Key Ring Decision for the consumer to discover what the personal long-term product values based on human goals were. However, it did influence the strength of the Key Ring Decision in the end, because there was a lot of effort needed. Cialdini stated that a commitment with a lot of effort is a more powerful.

This prototype was only focused on discovering the long-term value and it would be a good replacement for the interview. However, there was a lack of intrinsically motivation to fill in the guide. Humour or a game would add to the willingness of going through the process of discovering long-term goals.

INSIGHTS
- A more playful and fun way to work on the personalised set of values would be welcome.

FRAMEWORK FOR BEHAVIOURAL CHANGE

Five tests with prototypes, as solutions to different parts of the problem, have been conducted and analysed in the previous section. This section starts with the general insights of these tests as input for further design. Then, a framework for behavioural change is presented, which has been derived from the insights of the tests and the literature research. This section concludes with the validation of the solution space.

Input for Further Design

For the timing it is important that the trigger is before the purchase decision. This makes everything with channels like the wallet unfavourable. Another timing issue is that the design should fit the context. In the research through design it became clear that for example too much text in a chaotic environment does not provide a fluent interaction. The same counts for the depth of the questions asked. When a question is too complicated, a live conversation can let people easier dive into the subject and their own mind. However, the context of this conversation should not be distracting.

The depth and introspectiveness of the questions is a call for more humour and fun. Because humour can make the introspectiveness a bit lighter and more attractive to do. Especially personalised humour takes care of a focus on the product without distractions. This humour and inspiring positive questions contribute to the consumers' liking of the design.

One thing to keep in mind is that for public triggers, people should want to wear or use it and at the same time, it should attract the consumers attention. Otherwise the reminder is too subtle and at the moment of purchase the consumer has already forgotten his or her motivation. A standardised checklist can be learned by heart after multiple times of usage. It is difficult to make a checklist which covers different kinds of goods and a never changing trigger can also be forgotten quickly. Therefore, the continuous attention drawing is important.

Framework

To change the purchase behaviour, a framework is created to present all the stages which have to be taken (see figure 15). The purchase stages of Dewey (1910) are extended with two phases. First awareness has to be created, this

is the motivational factor of Fogg. The target audience are environmentally minded people, but these might not be aware of the negative environmental impact of products. Awareness has to be created depending on the level of knowledge and intention. The second step is discovering the personal long-term product values; the ability factor of Fogg. Consumers cannot make a sustainable purchase decision in terms of long-term psychological product value without the know-how what are the right products. This is also the step where the brain cycles can be reduced because these brain cycles are a factor which enlarges the intention behaviour gap. The third factor of Fogg's behavioural model is the trigger or reminder which should occur before the purchase decision is made. After the reminder, all three factors should be present at the same time. The fourth step is to apply the behaviour. Commitment in all the steps can contribute to the strength and success of applying behaviour change.

Validation through an Ideation Session

To validate that the ideas of the research through design are broad enough, an idea generation session was conducted to discover the solution space. The broadness of the solution space is explored and for every step in the framework, ideas are presented. See appendix 6 for the setup and results of this session. The conclusion is that the prototypes used in research for design cover a lot of aspects which were brought up. Therefore, the insights of the input for further design are broad enough.

MAIN TAKE-AWAYS

- To change the consumer behaviour four phases are needed: the creation of awareness, the discovering of the personal product value, the reminding of personal product values and the applying of personal product value.

- The triggers should attract attention but still be liked by the consumer to keep using it.

- Live discussions stimulate people to dive deeper into their own mind and facilitate thoughts about introspective topics. More humour and fun are required to make the discovering of the personal set of long-term product values lighter.

Awareness	Discover	Remind	Apply
Motivation	Ability/ Know-how	Trigger	

(Fogg, 2009)

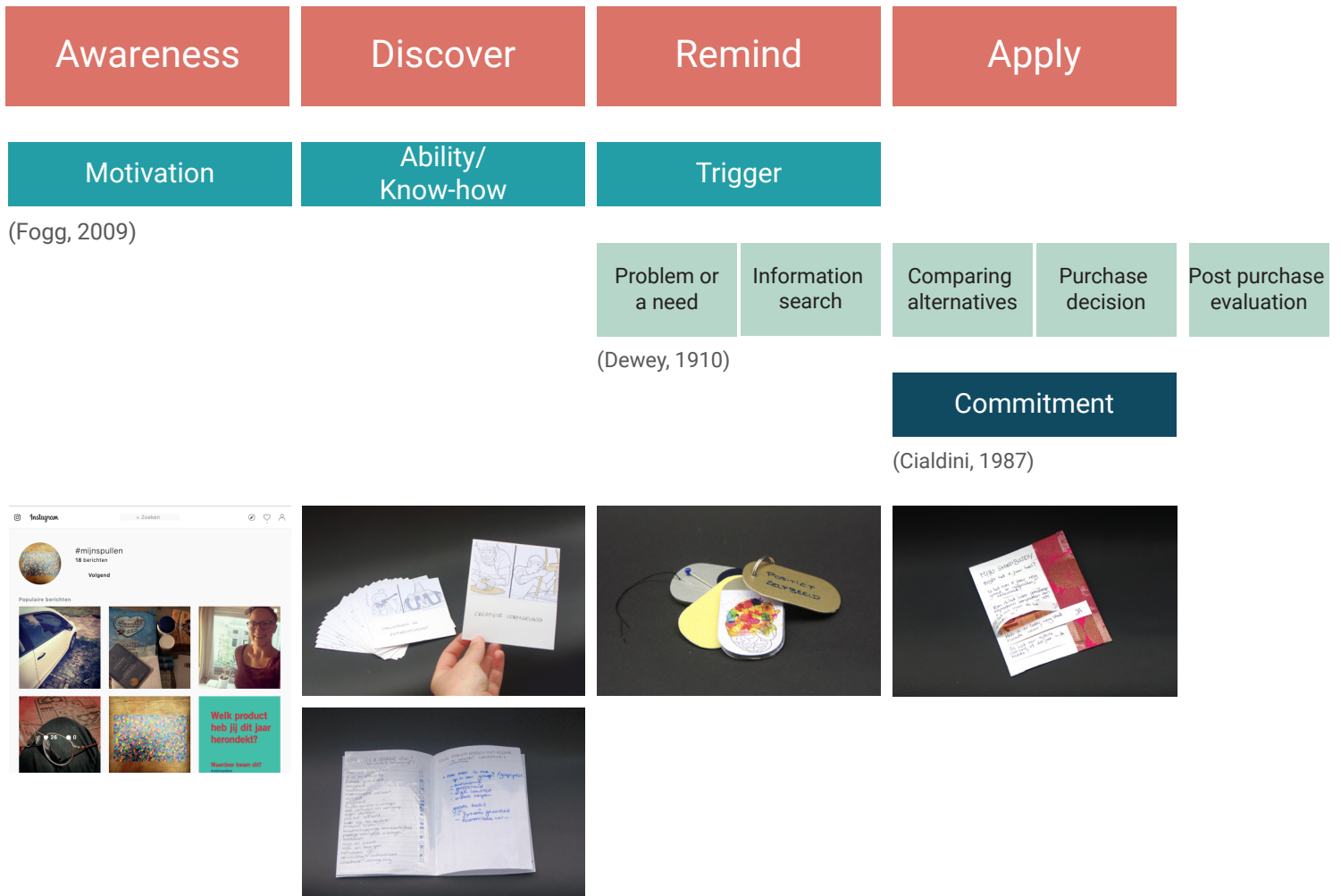|		Problem or a need	Information search	Comparing alternatives	Purchase decision	Post purchase evaluation

(Dewey, 1910)

Commitment

(Cialdini, 1987)

Figure 15. The different stages of the behavioural change framework, with the original theories of literature underneath. At the bottom of this figure, the different prototypes used for the research for design are presented.

DESIGNS FOR BEHAVIOURAL CHANGE

Designs based on the long-term psychological product value model and the framework for behavioural change are presented in this chapter. First the target audience is more specified. The combination of this specification with the framework for behavioural change has resulted in an updated problem definition. In addition, seven design criteria have been established. Three designs are presented after a set of iterations. After the presentation of the designs, the validation method is explained. The results of this validation method follow and with the reflection on all different parts of the context this chapter is concluded.

TARGET AUDIENCE

FOR THE DESIGNS FOR BEHAVIOURAL CHANGE, A MORE SPECIFIED TARGET AUDIENCE IS SELECTED: THE YOUNG PROFESSIONAL WITH THREE TYPES OF CONSUMER PROFILES. THIS TARGET AUDIENCE IS SELECTED ON THE BIGGEST IMPACT: ATTITUDE TOWARDS SUSTAINABILITY, PHASE IN LIFE AND CONSUMER PROFILE. SUBSEQUENTLY, THREE PERSONAS ARE INTRODUCED TO CHARACTERISE THE TARGET AUDIENCE.

Attitude towards Sustainability

The target audience is coined by the name beginner voluntary simplifier, they have an incentive of adapting to a frugal, anti-consumerism lifestyle, but are often seduced by desires (McDonald, Oates, Young, & Hwang, 2006). According to McDonald et al. this group may support some aspects of sustainability without embracing the whole lifestyle like the voluntary simplifiers. An important note is that both voluntary simplifier and beginner voluntary simplifier chose for less material possession due to free will and not due to lack of money.

Consumer Phases in Life

Next to the consumers' attitude towards sustainability, the consumer life phase is an important target audience characteristic. In figure 16 purchase behavioural differences are shown with the accompanying six stadia in life. We will distinguish the six stadia: living with parents, student, young professional, young family, children moving out, preparing for end of life. These stadia and behavioural differences are based on the interviews for the research in the chapter of long-term product value. In general the stadia are happening in a sequence, although in some cases certain stadia can be skipped or repeated. The 'moving in together' and 'divorce' stadia may even occur at any moment. The young professional is chosen as the target audience since they are starting a household and are in a financially independent position to purchase everything they desire. In addition, the young professionals are quickly adapting to a consumer style that has an impact on the rest of their lives.

Consumer Profiles and Personas

To determine what kind of factors are important in making a distinction between consumers, six consumer styles are proposed, based on the Profile of Consumer Style by Sproles & Kendall (1986). All consumers were composed of these six different factors, with one characteristic more

financial dependent identity
own identity
money for clothes

Living with parents

tight budget
financially dependend.
education
food

Student

2X

Moving in together

financially independent

Young professional

A
B
C

Young family

family updates

Preparing for end of life

Divorce

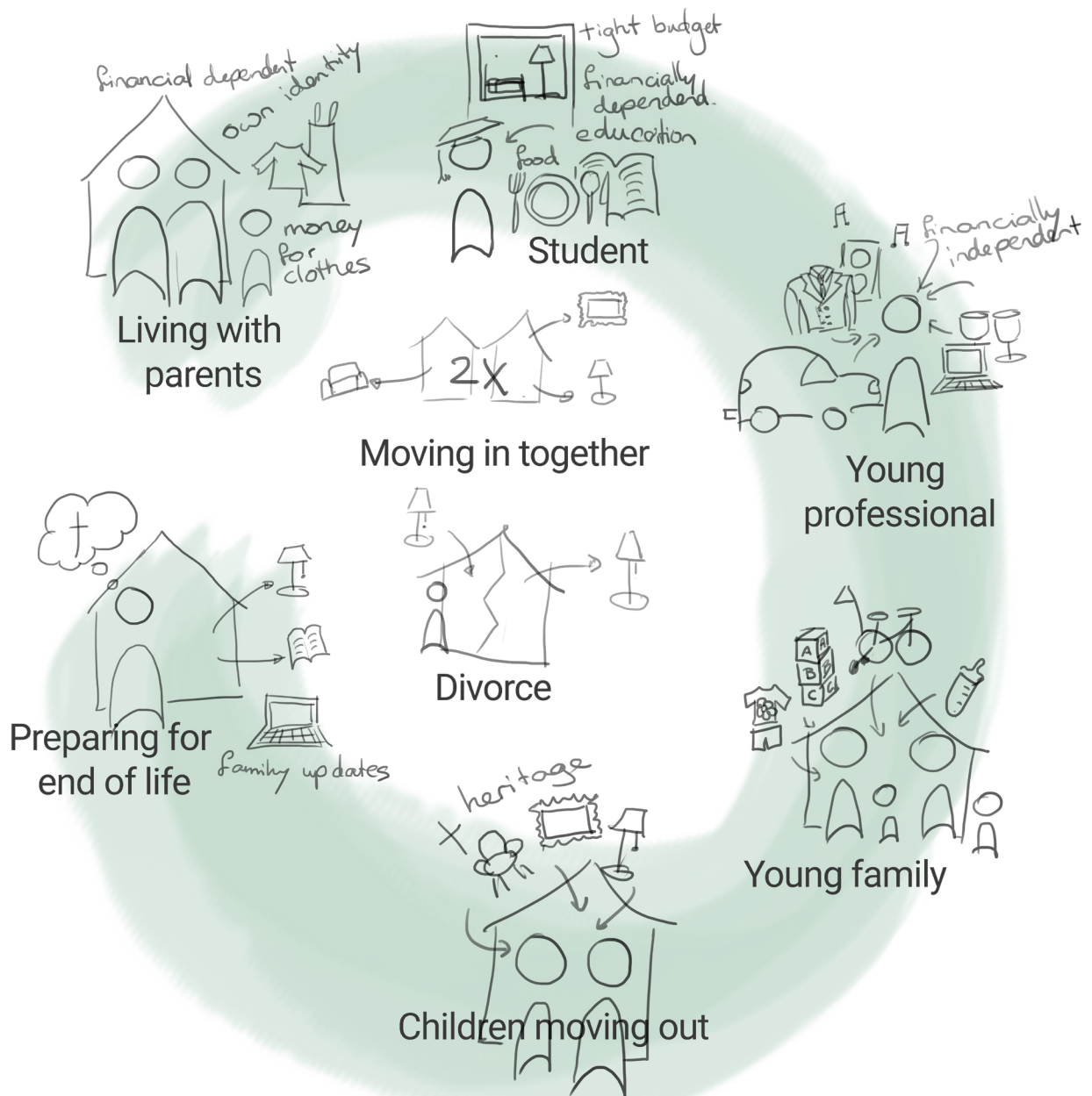heritage

Children moving out

Figure 16. The different consumer phases in life. These are distingiuished based on the interviews from the chapter Long-term Psychological Product Value. The young professional is chosen as target audience based on the large possible impact.

dominant than the others.

Five distinguishable sets of consumer characteristics were derived from the data of the interviews for the research in the first part as consumer profiles (see appendix 3). For the personas the first three sets of consumer styles were of most interest. The two which were left out were the men of quality and no-nonsense, and the bargain hunters. The first group were the people who already were focused on exclusively purchasing products of long-term value. The second group made their choices based on the value for money and therefore were most likely to search the cheaper option.

The first profile selected as target audience was the best quality for the lowest price. This group focused on sales and bargains. If the price is high, then the quality must be high too. They were brand loyal and more impulsive than the other consumers and they saw the sale as a big opportunity.

The second selected profile was the recreational fashionable shopper. They were quite moderate in every characteristic. This group did like shopping and did keep up with the trend. The last selected profile is the traditional and practical shopper. This group was focused on quality and they do like to purchase goods. They didn't care if it was in fashion or if it was the newest innovation.

To conclude, the final focus is now on the young professional and on expanding this persona with the three selected consumer styles. The personas are presented on page 65, 66 and 67. They gave a clear view on the target audience and their motivations in life. They were used to verify the ideas and select participants for the validation tests.

MAIN TAKE-AWAYS

- The young professionals in the beginner voluntary simplifier group are the target audience. With their start in the working class and low fixed expenses, they have a large spending power.

> " *I like to buy quality gadgets, so I make sure to know when sale is to get these gadgets at the best price.*
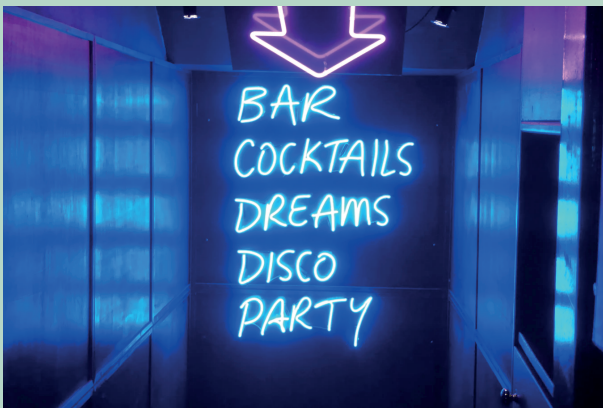
BEST QUALITY FOR THE LOWEST PRICE

Tom (33)

Financial advisor and still living in his studio. Likes good food, and partying in the weekends.

Shopping style: Very impulsive when he finds his favourite brands in the sale. He likes high quality shops and the current fashion. He wants a modern and comfortable life and likes well-known brands like Apple and Nike.

Laura (31)

A general practitioner assistent.
In leisure time likes to go on a city trip to European capitals. Became a vegetarian because of the environmental impact of meat.

Shopping style: She likes shopping and wants the latest fashion. She goes to second hand shops, but searches everywere for the newest fashion.

RECREATIONAL FASHIONABLE SHOPPER

I see shopping as a treasure hunt, you never know what you might find. Especially the sale is full of opportunities.

TRADITIONAL AND PRACTICAL SHOPPER

Marco (28)

A history teacher.
Loves to go for a hike in his holidays with his girlfriend.

Shopping style: He doesn't care about fashion, but just want quality products and it is nice if it is on sale. Not so impulsive and often goes to the same stores.

I like to have good stuff and I enjoy the outdoor shop, because quality is what matters most in these shops.

FINAL PROBLEM DEFINITION

THE PRELIMINARY PROBLEM DEFINITION IS UPDATED WITH THE BEHAVIOURAL CHANGE FRAMEWORK AND THE TARGET AUDIENCE. IN THIS SECTION, THE FINAL PROBLEM DEFINITION AND SEVEN DESIGN CRITERIA'S ARE PRESENTED.

Problem Definition

The preliminary problem definition is updated after prototypes have been tested, consumer styles have been developed and the target audience was defined in detail. During the testing of the prototypes, it became clear that one product was not sufficient to cover all the different stages of the behavioural change framework. Therefore, these stages were separated in the final problem definition:

The environmentally minded young professionals need a way to discover, to be reminded and to apply their personal long-term values in the decisions of purchasing usage goods such as electronics and household goods. This is because they want to translate their environmental intentions into sustainable consumer behaviour and to decrease their ecological footprint. However, they are hindered by the intention behaviour gap.

Design Criteria

Seven criteria are composed based on the list of requirements, the insights of the prototype testing and the final problem definition. The final problem definition did not lead to only one design. With the research through design phase, it became clear that it was complicated to include everything in one design. Therefore, all the following different design criteria have to be covered by the designs together.

- Create awareness about the negative impact of products on the environment.
- Appeal to the consumers; they have to choose and advocate for the tool.
- Let the consumer discover his or her human goals in life.
- Let the consumer experience that every person has their own different set of human goals and that they require different products to fulfil these goals.
- Remind the consumer in the product purchase phase that long-term value products are enablers of their human goals.
- Remind the consumer of personal goals in the desire phase of the purchase journey.
- Create commitment to change the purchase behaviour.

DESIGNS

Three designs to change the purchase behaviour are presented in this section. First it is explained why one single solution is not sufficient. Secondly the game The Only Three Products I Need in Life is explained. Thirdly, the Product Calendar is explained and finally the Stick to Your Values is elaborated.

Multiple Designs

A single solution for the problem definition is not found, since no item could fulfill all the roles in the framework of behavioural change. This was the conclusion emerged from the ideation session which was held to validate the broadness of the prototypes which were used for the research through design. See the last subsection of chapter Behavioural Change for this session. One design could cover the first stage of awareness and more importantly the discovering of the personal long-term product values. Another design should remind the consumers in the purchase phase about products as enablers of human goals and their personal long-term product values. The results of this session were the starting point of the development of the final designs.

A second separation was needed between public and private reminders; people do not want to share their personal long-term product values with the public. This became clear in the iterations of the triggers for changing purchase behaviour (see Appendix 8). Because the motivation was empowered by a public visible statement and the ability is the reminder to the personal long-term product values discovered in the game. This separation is translated in the product calendar which reminds about the personal long-term product values and the stickers which take care of the public environmental statement which leads to commitment.

The Only Three Products I Need in Life

The Only Three Products I Need in Life, is a game which facilitates the discovering of the personal long-term product values and trains in reasoning about products. This game was developed after a couple of game iterations and tests (appendix 7). The aim for this design is to meet the first four design criteria of the previous section. In this subsection the idea behind the game, the game setup and rules are explained. First the goal of the game is shown, subsequently the setup and game rules are presented and finally the ideas behind the game elements are explained.

Goal of the Game

The goal of the game is to discover what kind of human goals are fitting the consumer and which products enable these human goals. These goals should be discovered to make sure the ability and know-how are in place and before the purchase process is started and the trigger is implemented.

Setup and Game Rules

The game is for three to five players and will take about forty minutes. At the end of the game the goal is to guess which player has which personality and environmental card.

To setup the game, three product placement cards are placed in front of every player. In the middle of the table two closed piles are placed. One pile contains all the forty-eight product cards. The other pile contains the twenty product specifications. Every player draws a random environmental card. The first player draws five personality cards, chooses one and shuffles all remaining personality cards. This is repeated till every player has one environmental card and one personality card (see figure 17).

The game begins with the first player who opens one product card and one specification card. Every interested player has twenty-five seconds to pitch for this card and to tell the other players why he or she would like to have that specific product. The first player choses who gets the product card by choosing who has given the best pitch. The first player can also choose to keep the product himself. If a player gets a product card then he places this product card on one of his three product placement cards. If the player wants a different product on his product placement cards then this player can overlay the existing product with a newly obtained product. If none of the players show interest in the product then the first player puts the product aside and can draw new product and specification card.

The game ends if every specification card is drawn. Every competing personality is put on a pile and five random left-over personalities are added. The personalities are shown. Every player guesses and notes which personality and environmental card the other players have. The personalities

and environmental cards are being revealed. Every time, one point is awarded for the right personality or environmental guess. For everybody who has guessed your personality and environmental card right, half a point is subtracted. If nobody has guessed your personality right, then no points will be rewarded to your right guesses of others personalities. The same system is in place if nobody guesses your personality right.

Idea behind the Game Elements

Discussion of Introspective Subject

The research through design phase shows that an introspective subject is best discovered when in an enjoyable way. A game-form suits this criteria well. Another valuable discovery is that live questions and a discussion are more inviting to dive deeper into the subject. Therefore, this game requires multiple participants and provides room for discussion.

The discovery of ones personal long-term product values is already a game and the challenge was to make the game attractive and fun to play. This is in contrast to many serious games which are aiming to show a desired behaviour which is not a game in itself.

Sustainability Priming

The title and subtitle of the game are to prime the players about sustainability. The game is about being selective and not only grab every product one can get. The environment cards are stirring the discussion towards the direction of sustainability (see appendix 10). The game can provide a starting point of a discussion about sustainability.

Personalities and Long-term Value Products

The personalities are a translation of the human goals (see appendix 9). This translation is done to make it less abstract. With the personalities people have the freedom to discover what these human goals mean and with which they identify. The game provides a safe play environment where people can experiment with different personalities in order to find their own personalities. The environment cards are based on the division made by McDonald, Oates, Young, & Hwang (2006). In this paper, people are categorised in three groups based on their attitude towards sustainability.

Discussing whether a certain personality wants a certain product, eases the discovery of the connection between human goals and products. Based on this discovery, they can choose in real life for products which enables their human goals.

<u>Playing multiple times</u>

At the end of the game a winner is chosen via a pointing system. In the iterations, two motivations became clear why people want to play it again: to try out different personalities and to defeat the other players. So it has the preference to have a clear winning goal in the game.

This product is more alive and inspiring to talk about by the specification of the products (see appendix 11). Another advantage is that the number of different products is much bigger and that they keep being interesting.

Figure 17. An overview of the different cards of the game. This player is an environmentally adventurer, and can pitch in 25 second to his fellow players why he wants the simplistic laptop.

Figure 18. The Product Calendar is showing a surprsing tent. The bathroom user can reflect if the surprising tent is treasure or trash for him/her. This calendar makes people think about what products mean to other people.

PRODUCT CALENDAR

The Product Calendar reminds participants of the game and their own personalities. This is done by displaying selected products every day (see figure 18). After their personal human goals have been discovered in the game, people should be reminded in daily life about their intentions to evoke sustainable purchase behaviour. One of the two triggers is the Product Calendar which will be explained in this section. The aim for this design is to meet the last three design criteria.

PRODUCT CALENDAR DESIGN

The goal of the product calendar is to reflect in a quiet moment which products fit and which personalities are important. The product calendar are two piles of papers with a ring binder. On one pile are all the specifications and on the other all the products presented. Underneath the pages a question is posed: Treasure or trash for me? On the background all the personalities are listed.

IDEA BEHIND THE PRODUCT CALENDAR

Daily Attention

The product calendar attracts attention because the two piles can be turned independently from each other, a lot of combinations can be made. When sharing the bathroom with other people, an interactive element is implemented in the bathroom which could change daily. Therefore, the calendar reminds the consumers of the game on a daily basis.

Personalities

The personalities of the game are listed in the background. When looking at the products, the consumer is reminded of these different personalities and ways to look at this specific product. The consumer can search for itself the right personality why he or she wants that product.

Reducing Brain Cycles

The product calendar is lowering brain cycles, one of the two biggest barriers for environmental purchase behaviour. The brain cycles are lowered because the consumer is getting used to think critically about products. Therefore, the calendar is posed in the bathroom where one has time and concentration to spend on this topic instead of in an hectic shopping environment. This is an improvement after the research through design insights. With the ever-changing products, the product calendar provides a daily training to the mind with the critical question: 'Is this product treasure or trash to me?'

Private Reminder

This product is meant to be placed in the bathroom; a location that facilitates a very private reminder. There is room for a moment of reflection. The timing is not perfect because it is not a reminder in the shopping phase. However, is it private and does attract attention.

Stick to Your Values

The second design for a trigger is Stick to Your Values (see figure 19). These stickers are a public statement which enforces the commitment for consumers to stick to their intentions. The last three design criteria are met; with the specific focus on the last criteria. The sticker is the third and last design for the validation and is elaborated in this section. The sticker is still focusing on the trigger in Fogg's behavioural model, but is in contrast to the bathroom a public statement.

STICK TO YOUR VALUES DESIGN

The stickers are translucent and have a year number of the past thirty years. Around the number there is the text: The only product I need. The stickers come in a booklet with the instructions: 'Use the stickers. Apply the game in your everyday life. Stick the stickers on products which are valuable for your personalities. Match the year with the date of purchasing. Ask yourself, the next time when you go shopping, if the product will also earn a sticker. Contribute to a more sustainable world.'

IDEA BEHIND STICK TO YOUR VALUES

Translating the Game in Everyday Life

The text is in line with the game and helps to translate the products of the game towards products in real life. The consumer is reminded that long-term value products are enablers of their human goals. The packaging also instructs to ask oneself the next time when buying something whether it deserves a sticker. This is like a checklist for the next time buying a new product. Brain cycles are lowered because the consumers have already thought about what is valuable in their lives.

Creating Commitment

The sticker can be applied to daily public objects. Cialdini states that the willingness to act consistent with certain commitments is stronger when the commitment is public. Also, the sticker is powerful to enforce the image of an environmental self and this image will enforce the motivation too.

Conversation Starter

New attention is drawn towards the sticker, when peers ask questions about it. This is positive because after a while the stickers might lose the newness which leads to less attention which lowers the commitment and motivation. It functions as a conversation starter to spread the awareness and enforce the commitment of the owner.

The Message

This sticker is not another new product but only upgrading the existing products because it can be applied to existing products. The date on the stickers can make people more proud of having products already for a long time and appreciate the old.

Figure 19. This laptop contains a sticker of the Stick to You Values collection. The user thinks this laptop deserves a sticker and enables her human goals.

VALIDATION METHOD

A validation session with the target audience for a duration of multiple weeks gives more insights in the effects of the designs for behavioural change. The three designs which were developed after a couple of iterations are now tested for a longer period of time. The setup of this validation test is explained in this section.

The actual behaviour changes are hard to measure in a limited amount of time with a small amount of participants. Therefore, the validation will be a qualitative research focusing on the intention of sustainable purchase behaviour and the use of the triggers and the game.

For the validation, six participants which fit the target audience were gathered. These participants were selected because they agreed with three questions; they have sustainable intentions, they are willing to buy less products and they do not succeed in this already. The participants were between 25 to 27 years old. They all had a master's degree and some were more into sustainability than others. The validation took place from the beginning of August until the beginning of September 2019. For the results only five evaluation interviews were held. The sixth did not play the game and did not use the stickers and product calendar. Therefore, the sixth participant was not included in the final evaluation session.

In the first week they received a copy of the game, the collection of stickers and the product calendar (see figure 20). They were asked to play the game in the first week one or multiple times, to hang the product calendar and to use the stickers. Photos were asked of the participants playing the game and the stickered products.

Three weeks later, an extensive evaluation interview was held face to face. This interview was guided by a form with nine statements about the seven design goals (see appendix 13) and the interview guidelines (see appendix 12). On a six point Likert scale the participants could indicate how much they agreed with the statements. In the evaluation interview, every participant had filled in the form two times: one time how they felt before playing the game and one time how they currently feel about the statements. The difference between the two results was discussed with the participants. These conversations were voice recorded after given consent. The results were categorised, analysed and can be found in the next section. The analysis was done by categorising the most interesting insights. In this final evaluation session, questions were asked about the development of a more sustainable purchase behaviour. Also, the three designs and seven design goals were discussed.

- To validate the change in consumer behaviour in the long-term, five participants have tested the three designs for one month.

Figure 20.   Six prototypes of the game ready to give to participants for the validation test.

Figure 21.   Three photos made by the participants of the validation test when playing the game.

RESULTS OF THE VALIDATION

The three designs for behavioural change have been tested as described in the previous section. The results of the validation test are presented in this section; categorised by the design criteria. The results of the statements of the design goals used in the validation interviews can be found in appendix 14. On page 82 and 83 a graphical overview of the hypothesis and results is presented.

Create awareness about the negative impact of products on the environment

The participants and their entourage were all sustainability minded before playing the game. The game made them aware that products also have a negative impact on the environment. Four participants indicated that this impact of products was a real discovery, as one participant said: "Before this I was not so aware that I could make an impact with the products I have." For one participant it was more of a reminder: "I am working in the sustainability sector, so it is more of a confirmation and reminder for me."

Appeal to the consumers; they have to choose and advocate for the tool

The game was highly appreciated by the all participants and everybody had a good and humorous time. Four participants indicated that in order to have a good time, it was very important to have enough time to play, focus on the game and other players who like to discuss. Two participants mentioned that it served as a discussion starter: "The game is a cool discussion starter, after playing we talked about it for a long time." All participants were enthusiastic about doing the pitches. One participant indicated that the game did not take a lot of time, was simple explained and did not acquire a lot of space to play. None of the participants indicated that he or she would buy the game in the store for him or herself. However, as a present for somebody else they would think about buying the game. One reason people would not buy the game was like one participant said: "The moment you see something that is going to create awareness, you have already made a choice for yourself: 'I am or I am not aware and I want to become more or less aware of it'. I don't think that if I think: 'I want to become more aware of sustainability', I would buy a game. Then I would rather do online research." However, they do think it was a nice positive way to talk about buying less products: "Not buying stuff is something that keeps people busy, but at a certain moment they think: 'stop

	Create awareness about the negative impact of products on the environment.	Appeal to the consumers; they have to choose and advocate for the tool.	Let the consumer discover his or her human goals in life.	Let the consumer experience that every person has their own different set of human goals and that they require different products to fulfil these goals.	Remind the consumer in the product purchase phase that long-term value products are enablers of their human goals.	Remind the consumer of personal goals in the desire phase of the purchase journey.	Create commitment to change the purchase behaviour.
GAME	The environment cards stear the discussion towards products and the environment.	It is a game for multiple players. Friends and family are invited to join this discovery.	With the pitch about products, the game shows differences between people and their human goals.	Trying out different personas enables the player to feel what fits his- or herself.			Purchase the game creates a little commitment because effort and money has been put into the game.
PRODUCT CALENDAR		The calendar is only visible for those who come and visit the house.			The calendar reminds consumers of the game and the personalities are written as background. Therefore, the connection between product and personality can be made.	The question 'Treasure or trash for me?' is about the products and the personalities which are at the background of the calendar.	Placing this calendar in the bathroom creates a bit of commitment.
STICKERS	Other people can begin the conversation by asking why there is a date on the products.	The stickers are subtle, have a public function and can be conversation starters.		The stickers mark every product which is valuable for the long-term. The translation of personalities towards products is made.	Everytime the user sees the sticker he or she will be reminded of the game. When the user gets used to the stickers, questions from other people will spark new motivation.		The public statement enforces the commitment.

DESIGN CRITERIA	Create awareness about the negative impact of products on the environment.	Appeal to the consumers; they have to choose and advocate for the tool.	Let the consumer discover his or her human goals in life.	Let the consumer experience that every person has their own different set of human goals and that they require different products to fulfil these goals.	Remind the consumer in the product purchase phase that long-term value products are enablers of their human goals.	Remind the consumer of personal goals in the desire phase of the purchase journey.	Create commitment to change the purchase behaviour.
GAME	The environment cards steared the discussion towards products and the environment.	The participants were enthousiast about the pitching and would recommend the game to others.	Choosing different personalities facilitated the discovering of the personal set of human goals.	Reasoning with different perspectives made the participants realize that different people need different products.	The participants learned to reason why they want certain products instead of just taking them.		
PRODUCT CALENDAR		All participants liked the design and some liked the interaction with the calendar.		The participants who have used the calendar thought about why others would want the different products.			Only the participation of the test and the required time and effort raised the commitment of the participants.
STICKERS		The stickers were subtle and the participants liked the design.			The participants did translate the game into real life and thought about which products were valuable to them and why.		

whining.' This is a nice positive approach."

The appreciation for the product calendar was more scattered. Two participants described it as a nice moment for reflection and did turn the pages out of curiosity in contrast to two others out of a sense of obligation for the test. One participant indicated that a lot of products were seen as trash, this demotivated her to use the product calendar. Another participant used it as a challenge to reason why others would like to have that product.

Four of the participants have used the stickers. They indicated that Stick to Your Values has a low threshold to paste them because of their translucency. The participants thought the layout was okay and that they would not remove them as soon as the test was over.

Let the consumer discover his or her human goals in life

Everybody did recognize theirselves in some personalities and that the game helped to think about their personalities: "I had never thought about what my personalities were and what effect that would have on my buying behaviour." The participants indicated that half of the times, the players picked a personality close to them, others picked an extreme opposite character. In the second run they all want to switch between these two. One participant said: "Next time I play it, I want to choose someone unlike me. I think I can learn more from it by reasoning from a different perspective." The single personality made characterisations of people which was more easy to play: "It was fun to go into extremes and use all the clichés." Nobody had discovered all their personalities, but they said they could if I asked them to: "I should have written down my personalities after the game."

In the interview, all participants were confused about the terms of human goals and personalities. It was not clear that human goals were things humans do because they like it instead of a target goal. The personalities were confusing because two participants felt they were much more complicated than being just one personality.

Let the consumer experience that every person has their own different set of human goals and that they require different products to fulfill these goals

Every participant thought that different people need different products, like this participant said: "The personalities represent people who have a different lifestyle because of the things they do or the culture in which they live. Not everyone needs a car or an air fryer." Another thing what was noticed by three participants themselves, was an increasing degree of their empathy. One of them said: "Other people buy something in a cheap shop like the Action and I am seduced by a beautiful monitor. I realise that now." Another participant contributed: "There are things that I don't give a damn about, but that others value very much. Fine by me, as long as they think about what they want."

Remind the consumer in the product purchase phase that long-term value products are enablers of their human goals

Every participant indicated that they are more aware of why they are happy with their products: "I have a clearer understanding of why I am really happy with some products. The underlying reason I never really had in mind and now I started to think about why I am happy with it." Three participants indicated that they were helped by the stickers. Not the visual reminding function was helpful, but the process of deciding which product deserves a sticker. Another purpose of the stickers was told by one participant: "I have kept the stickers in mind the whole time when buying new furniture when I moved in together with my boyfriend."

Remind the consumer of personal goals in the desire phase of the purchase journey

The specific reminding of personal long-term product values in the purchase journey was not triggered by the design. Two participants suggested a game follow up were the players should select all the personalities which they identify with. One participant had noticed the personalities on the background of the product calendar, but it did not trigger to think about them.

Create commitment to change the purchase behaviour

Two of the participants have noticed that their commitment has raised to buy products for the long-term. On the question if the participant was more committed to change her purchase behaviour, she answered: "Yeah, it's this participation that has stirred that up." The commitment was triggered by the participation of the validation test instead of the product calendar and stickers. Three of them indicated that they thought their actual purchase behaviour did not change yet.

MAIN TAKE-AWAYS

- The game has covered all the design criteria of the awareness and discover phase like predicted in the hypothesis.

- All the designs appeal to the consumer and the stickers also remind people that products are enablers of human goals.

- There is no aspect in the designs which reminds of the personal set of human goals in the desire phase.

- The commitment seems only be created by the time and effort put into the participation of the test.

REFLECTION OF THE DESIGNS

In this section the designs are reflected how well they fit the list of requirements and the target audience. At the end, the system map is reviewed and the possibilities for a business model are presented.

List of Requirements

The reflection of the list of requirements was based on the list on page 38. The psychological lifespan of premature obsolescence was prolonged. This was done by giving guidance in what was valuable in the long-term and training in reasoning. Also the designs were a direct tool for the consumers. The focus was on the usage goods by naming them on the products cards in the game and on the product calendar. An iteration is needed to pick products which are covering all the categories of usage goods, cover all the personalities and to see which products are inspiring for a pitch. In the results it became clear that every participant liked to play the game. For the stickers and the product calendar the reactions differed, these reactions were never negative but some were neutral.

The designs enabled the consumer to see products as enablers of their goals. Also, they were able to discover their own set of long-term product values. However, they did not have a clear overview of these values. A design to facilitate more of a checklist is desired in a next iteration. This design might be one of the steps to facilitate consumers to pull for a more sustainable economy. The two biggest barriers for this sustainable consumption are the required effort and time. Thanks to the practicing element of the game, the required brain cycles are reduced in the moment of shopping. But time and the required effort are needed for this practicing in advance. All designs together cover the motivation, trigger and ability/ know-how. However, as showed in the table on page 83, there are some stages when the designs are weaker in their effect than assumed. The designs do not take into account the influence of raised standards of living or changing aesthetics. There is only an effect to realize that different people need different products. This might also be a focus for the next iteration.

Target Audience

The target audience is defined in the first section of this chapter. The focus on the beginner voluntary simplifier of the subsection Attitude towards

Sustainability has resulted in a positive attitude towards the game. However, a lot of the participants would recommend their friends to play the game who are not into sustainability and to encourage them to think about the topic.

The validation showed that the game has most impact on people who are moving (in together) and making big decisions about decorating their homes. These people were asking themselves the questions what would be still valuable in ten years' time. It was the first time they had to make long-term decisions. Concluding, the designs are well suited for the young professional.

The personas were presented on page 65. The persona of the best quality for the lowest price are well served with the game. Because their considerations are if the bargain is good instead of the value of the long-term. Therefore, they can learn a lot from the game. However, they have to find another way to get the kick on purchasing goods and they need a huge feeling of commitment.

The persona of the recreational fashionable shopper was always searching for new items. The game can provide her with more focus on the things she really needs. She likes the product calendar to dream away and think about all the possibilities. This persona might have to search for other ways, like updating items or other forms of possessing goods like sharing or leasing, to get the satisfaction of keeping up to date.

The traditional and practical shoppers are not so much helped with the design. They already know what they want and are not so sensitive for bargains. The stickers might help them to reappreciate what they already have. But the product calendar is only showing products they don't like to have.

System Map

Consumers were the target audience for this project, but there are much more players in the field that influence each other. In figure 23 a brief representation is presented of these stakeholders. This figure is based on the interviews with the consumers, the interview with the Dutch consumers' association and common knowledge.

The main influencer for the consumer is the crowd which consists of family, peers, friends and other people in society. They have a direct influence via social media and in real life. The interaction with peers in the game can become a positive influence to accelerate the awareness about the game among friends. Also, the retail stores have a big direct influence. The products displayed in the stores determine the frame of reference. This will probably lead to temptation and desire to own these products and keep up with the fashion. To resist these temptations in stores and online the commitment should be strong.
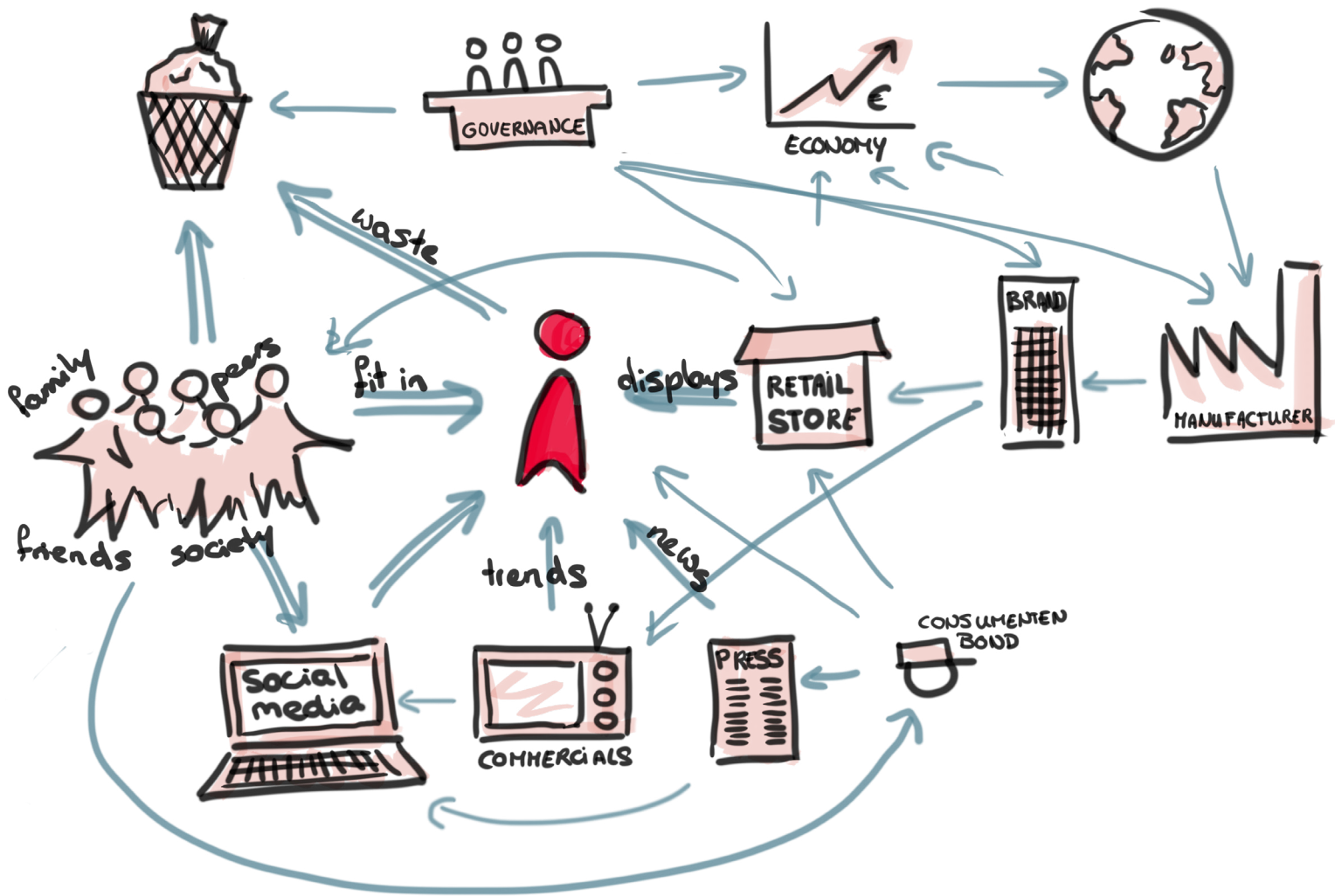
Figure 23. The systemmap of the consumer of the products, with the stakeholders and the magnitude of their influence indicated with arrows.

The environmental values are influenced by commercials, news channels and the crowd. An example of this influence can be seen with the phenomena of fly-shaming. People are pressured to act differently and slowly changing their values (Volkskrant, 2019). These environmental values are important to contribute to the image of a sustainable self and in the end to the commitment.

Brands are an indirect influencer. They are known by the consumer via retail stores or through commercials. These brands might contribute to more sustainable purchase decision to promote more the enabling function instead of selling only the perfect image.

Finally, the government has a little but stable role in the system where it tries to maintain a healthy economy, encourages the production/ retail parties and has to deal with the general waste management. They are also in charge of rules and regulations about the product longevity in production and marketing. But for influencing this design it would be one step forward if they keep acknowledging the negative impact on the environment of products and keep supporting initiatives for product circularity.

Business Model

Next to the design it is important to have a clear vision about potential in the public domain. I see three possibilities for the business model. One with a game and triggers which is focused on the sustainability in promotion and design. This leads to a focus on the niche market of sustainability minded consumers. The other possibility is a game with triggers on a more subconscious level which targets the mass market. The last possibility is to develop a game for schools and aim at a younger target audience too.

The first possibility, with a focus on sustainability, can be developed, produced, distributed and promoted by companies like HEMA or IKEA. These companies have both an increasing focus on sustainability and have their own channels for production. The game with triggers would be at the gift, game or sustainability department. Another option is to give this game as a present to new customers for example at sustainability oriented banks like Triodos or ASN. They would outsource the development and production to a game developer like 999Games. The target audience of these companies stays the sustainability minded people, but the focus on young professionals is less. Only if it becomes a special gift for moving in together or buying a house, a focus on this specific age group can be established in this case.

The second possibility is to make a subconscious version. This can also be done by the HEMA or IKEA. In addition it can also be in more general game stores which do not have a focus on sustainability. Most likely the game is then also developed by a game developer like 999Games. This scenario involves also an ethical question: Is it ethical to move people subconsciously

towards a more sustainable consumer behaviour? In my opinion all people can be more critical on their consumer behaviour. Learning more about someone itself does not mean this person is nudged into a certain behaviour.

The last possibility is to create a game for schools with the educational purpose of changing the children's view on purchasing goods. ThiemeMeulenhoff is a developer for educational material which could develop this game for the target audience of children at school. They also have the facilities to produce, distribute and promote the designs.

The costs are mainly in the development, production and promotion. The promotion might in cooperation with a partner like SIRE. This is an independent foundation which promote societal issues. The revenue streams are from product sale, therefore, an investor should disburse the costs of initial development.

MAIN TAKE-AWAYS

- The designs are an answer to the problem definition and all requirements are met, but an iteration on multiple aspects is preferred.

- Two out of three personas are fit for this game. Probably their kick or satisfaction of shopping should be replaced with another activity which provokes the same effect.

- There are three possibilities for business models; be added to the product portfolio of HEMA or IKEA and as a welcome gift for sustainable minded banks, a subconscious sustainability focused version in generic play stores or an educational version for schools.

DISCUSSION &
RECOMMENDATIONS

In this report three researches with outcomes are presented. These outcomes will be discussed. First the long-term psychological product value model is discussed and followed by the framework for behavioural change. Finally the three designs are discussed about their possible improvements and applications are being treated. This chapter concludes with the further recommendations and the project reflection.

PSYCHOLOGICAL LONG-TERM PRODUCT VALUE

Discussion

In the chapter about long-term psychological value I tried to find the answer to the question: how consumers now can decide if they still value the product in five to fifty years' time. This is researched by conducting in-depth interviews to get a clear view on consumers motivations and values. A long-term value product should fit one or more of the three categories of the long-term psychological product value model: satisfying basic needs, carrying memories or enabling human goals.

This long-term psychological product value model is an addition to the lifespan model described by Rau & Oberhuber (2016) and Van Hinte et al., (1993). Although Rau and Van Hinte created this models, my insights confirmed that the proposed expansion explains which products are used for a longer period of time instead of which factor plays a role in replacing the product. Designers and consumers should understand which factors play a role in sustainable purchase behaviour. This is important if the people want to contribute to a more sustainable world via their products.

This model is composed for consumers to choose for long-term value product themselves. However, this model can also be used by designers and marketeers who want that their designs not only be purchased but also used its whole lifespan. They can promote and design their products in a way that only consumers who tick one of the boxes purchase this product,.

Recommendations

One of the improvements of this research is in the determination of the human goals. These goals are taken from the card set of the Delft Institute for Positive Design (2017). An extensive research to these goals and if these are the right enablers of the long-term value can contribute to the completeness of this model.

With this project I try to expand the field of product longevity. More research and designs should focus on the purchase decision by consumers to create more impact.

BEHAVIOURAL CHANGE

DISCUSSION

In the chapter of behavioural change, the question is how the consumer behaviour can be altered to make a different purchase decision. The result is a framework with four stages that all have to be covered before the behaviour change to sustainable purchase behaviour is successful. This framework is composed in response to the results of the research through design.

This framework is an combination of different studies and research through design. It is based on Fogg's behavioural model in combination with the different purchase stages of Dewey (1910). With the commitment creation of Cialdini (1984) at the end, the intention behavioural gap is tried to overcome.

It was difficult to gather participants because the test and evaluation were time consuming. Therefore, not every question was asked and the test period was kept as short as possible.

The framework is made to give an insight at which moment of the consumer journey what kind of goals should be reached to change the consumer behaviour. The validation test indicated that without fulfilling the last stage with enough commitment, the purchase behaviour is not changed. Therefore, the framework would be more useful if design guidelines are added about how to create commitment. This framework could then also be used for other consumer changes like choosing for durable usage goods or maybe in the second hand fashion or consumer goods like locally produced food.

RECOMMENDATION

This model is based on spoken statements of participants. But because this model is about enclosing the intention behaviour gap, a research on larger scale would say more about the actual validation of this model. Behaviour change is not to be measured in one month, but needs a couple of years to develop and stabilise. With such a large scale test, the long-term effects can be concluded.

DESIGNS FOR BEHAVIOURAL CHANGE

Discussion

To change the consumer behaviour and reach the goal, let consumers only buy long-term value products, different designs are developed. The designs are based on the psychological long-term product value model and the behavioural change framework. The game let consumers discover their personal set of long-term product values. The product calendar is a reminder of these personal goals and the stickers translate the game to the real world.

Gnanapragasam et al., (2018) says that there is more research needed how to translate the sustainable intentions of people in actual behaviour. This designs and their validation contribute to the knowledge about translating these sustainable intentions into behaviour.

More iterations are needed, but the validation of these designs shows that a game with accompanying triggers can change people's view on purchasing products. It might be one step in a larger transition how society judges product purchases. In addition, this design shows that there is a positive way to decrease the amount of purchased products. The focus is on buying the right usage goods instead of buying less in general.

One of the results is that there was no aspect in the design which reminds of the personal set of human goals in the desire phase. The hypothesis was that the Product Calendar would remind about the personal set of human goals. However, the calendar did only remind that different people need different products. In iterations another trigger should be developed to contribute to the facilitation of making decision based on long-term product values.

The method used for the validation was appropriate for the scope of this project. The number of participants were just enough to give an indication of the effects and recommendations for iterations. However, a duplication of the amount of participants would have allowed for a more thorough analysis on the impact for different consumer styles.

It could be that the product calendar has had more effects on a subconscious level, but they did not came to the surface in the validation interviews. To give more certainty about the effects on the purchase behaviour, I suggests a more quantitative test. For this test, a much larger number of participants is needed over a longer period of time. In such a test can the subconscious level also be measured because the test is not based on self-reporting.

This comprehensive quantitative test can also be used to measure the effect of the designs on the subconscious commitment. Because a results of the

validation is that the commitment was only created by the participation of the validation test. This confirms Cialdini's statement that commitment is more powerful when time and effort are invested. However, the participants did not indicate that the designs evoke also a commitment. The subconscious level could not be measured through the current method.

The ideation session to discover the solution space shows that there are a lot more design possibilities with the long-term products value as a starting point and the behavioural change framework as a guideline.

RECOMMENDATIONS

Several improvements can be made based on the results of the validation test. The game is missing a last stage were the personal set of human goals becomes explicit. In order to create more of a checklist for the trigger, this explicit list is needed. The triggers should attract more attention. I see the possibilities in the rational override interventions to interrupt the automatic pilot of our brains and to change the purchase behaviour.

In the validation, there was a clear moment in time where friends had to come to play the game. The product calendar and stickers were a lot more free to use. Because of the lack of a designated time to invest in these two designs, they are a bit less used. An iteration of the stickers can be to piggyback existing habits and like the product calendar have it connected to a specific daily activity or place.

The sticker became not a conversation starter, probably because of the sticker placement and the modest appearance. The commitment will be most likely to rise when the sticker is a public statement what means that others will notice the sticker. More humour or attracting attention might improve this.

FURTHER WORK

In the research to sustainable purchase behaviour, many problem cases are discovered. For this research only three cases are covered. The other cases where more research or solutions are needed are presented in this section.

This project is dealing with the psychological lifespan of premature obsolescence. However, there are more causes of consumerism where the consumer can change something himself. For example, the hedonic treadmill can be handled if we find something which evokes the same satisfaction without buying products.

In order to buy something of long-term value, all three aspects of premature obsolescence should be considered and contribute to a long product lifespan. This project does cover the psychological lifespan, but also the technical and economical lifespan should also be tested. Therefore, solutions are needed to test the technical and economical lifespan in the purchase phase.

In the interviews, there was an interesting phenomena noticeable: People did want to give away their unused products, but many people they did not want to buy or get second hand products. Further research might make clear how to make sure people don't store unused products but that the threshold of giving away and buying second hand becomes lower.

The last topic I would like to suggest for further work is the communication about the negative environmental impact of products and raising the awareness. A general understanding of this impact might raise the motivation of the behavioural change framework and therefore accelerate the awareness about long-term psychological value products.

REFLECTION

I learned in this project that doing research through design is not about coming up with the best design, but about doing profound research. A good setup and sharp criteria contribute to trustworthy results and can help others along.

The gathering of participants was hard because I felt like I was asking too much of the people close to me. The result was that I did the tests less methodological than I wanted and maybe not always asked every question I wanted to ask. If I could have hired people via an external agency, I would feel less uncomfortable with the time they spend on testing my prototypes. But I also realise that this is not possible for such a project and that the little conversations with everybody have increased the consumers acceptability of the prototypes.

Next time I would formulate the criteria earlier. I formulated the criteria after coming up with the final design, and therefore I would have chosen triggers to validate that were more checklists to remind of the personal long-term product values on the way and not only in the bathroom. Also, these triggers would be more direct to give more direct guidelines.

With this big individual project I have learned how much I missed the team effort and the discussions to keep each other on their toes.

More information was gathered then could be properly analysed. This is because the relevance of the gathered data changed over the course of the project.

The written communication was a real challenge. A lot of people helped with the structure and the English language. I did improve my writing skills through this thorough feedback. However, it is still a large obstacle for me.

I have developed my skills in doing qualitative research for an idealistic purpose and turning this into an actual design. I have also learned that I like to do idealistic projects with a realistic end result. This project gave me the confidence that I can manage and execute my own design projects while still enjoying every stage of the project.

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