

GUIDE TO GREEN

DEVELOPING A TOOL THAT PROVIDES INSIGHTS INTO THE
USE OF MESSAGE FRAMING FOR PRO-ENVIRONMENTAL
CONSUMER BEHAVIOUR CHANGE



GRADUATION THESIS
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GUIDE TO GREEN

DEVELOPING A TOOL THAT PROVIDES INSIGHTS INTO THE USE OF MESSAGE FRAMING
FOR PRO-ENVIRONMENTAL CONSUMER BEHAVIOUR CHANGE

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PREFACE

"All you can know is what you experience"

- Littlejohn & Foss (2011, p. 47)

And an experience it has been. Reading, writing, designing, and talking about this thesis filled most of my days the last nine months. I've always been pro sustainability. I see no reason not to be. But over the years I'd come to realise there are many people that think, and especially act, differently. Discovering how people behave, why they don't act or just don't care fascinates me more every day. It seems so obvious to me that we need a sustainable transition, but the transition is not going nearly as fast as it should. Quite a bit of breath and ink have been spent over why this is, but my rather nerdy grandfather had a brilliant answer: "Work is not difficult, people are difficult".

Agreed. If people are the problem, then how can we use what we know about people to change their behaviour? Suddenly I was interested in social psychology, a field totally new to me. As the months passed I have learned so much about the human mind, behaviour barriers, influence mechanisms, and how to frame messages to change people to a new behaviour. I must admit, I've most definitely not become a master of persuasion, I wish. I have to settle for a double Master of Science, but I won't complain about that. Working on this thesis was fantastic. But sometimes, when work did get difficult, it was people that made it easier. Therefore, I would like to thank some of them for making my experience the last couple of months better than it already was.

To start formal, thank you all my examiners for allowing me to perform such a social study at such a technical university. So, thank you Gerdien, Steven, Maarten en Udo for always being interested in my research and supporting my choices. I hope you like the result. Thanks Leo, and De Energiebespaarders for allowing me to learn from you and eat brie sandwiches together.

To continue less formal, thanks to Sander for your inspirational quote I don't remember and always making fun of me. Bram, for helping me with all your computer skills and the points that I missed. I owe you two some stories. And my other fellow SEC'ers for the breaks, cups of tea, and conversations about graduation struggles. You've made my year so much better.

And least formal, but ever so important. Homies, thank you crazy people for liking me. I like you too. And mom, dad and Nien, you've made me who I am. I love you guys endlessly. And thanks to everybody who has ever said something that triggered me to think again. Especially my oldest friend Demelza. And lastly, thank you Britt and Amigo, for keeping me sane. Yes, I just thanked me horse.

But it's time to talk about what you are actually here for: this thesis. If you are already an expert on behaviour change, please start using my tool and enjoy changing people their behaviour for the rest of your life. Please make them more sustainable. If you're not an expert and want to learn, enjoy my long read, I promise it's interesting. And if you at any time feel that human behaviour is endlessly complex but ever so interesting, I'm always eager for a coffee and a good conversation.

SUMMARY

"I alone cannot change the world, but I can cast a stone across the waters to create many ripples."

- Mother Teresa

Communication is just as essential as it can be fatal for the success of sustainable development. The Dutch government believes that the sustainable transition should be powered by bottom-up innovations (Kamp & Mansveld, 2013). One group at the core of bottom-up innovations are the start-ups developing those sustainable innovations. However, these start-ups can only power the sustainable transition if they know how to grow their innovation. In doing so, growing is not only a technical challenge, but an equally important social challenge (Ministry of Economic Affairs, 2016). To change the system at large, the start-ups, who find themselves at niche level of the transition, can grow their business if they can change the inaction of their potential consumers to a new desired behaviour (Geels, 2002). But, knowing how to do so requires start-ups to understand how people behave, which barriers they experience and how to apply mechanisms and design to overcome these barriers (Magee et al., 2013; Nerlich, Koteyko, & Brown, 2010). However, many start-ups lack manpower, time, and resources to obtain the right expertise on combining these insights and applying them in their message framing.

This thesis offers an initial attempt to provide product developers at sustainable start-ups with a tool that enables them to design their messages in a way that stimulates sustainable consumer behaviour change. Research has provided a good knowledge base on 1) human behaviour and behaviour change. Other research shows it's not a lack of opportunities that inhibit sustainable behaviour, but that 2) it's the barriers that are the cause of inaction (Gifford, 2011; Kollmuss & Agyeman, 2002). One way to overcome barriers and change behaviour is through 3) message framing. Framing involves the way in which we tell a message

to salience a specific part of that message to affect or stimulate the receiver's opinion, and ultimately his or her behaviour (Entman, 1993; Lakoff, 2010). By combining these three research areas, this thesis aims to answer the following research question:

How can behaviour change models, environmental behaviour barriers, and influence mechanisms be integrated into a tool that offers start-ups insights into message framing for sustainability?

To answer the research question this study uses a combined research method stimulating an iterative design process by continuously switching between theory (literature) and practice (expert and target group input). This methodology consists of the coupling of the Design Based Research (DBR) approach and the Double Diamond design method. The combined methodology is based on the four steps of DBR, and incorporates design steps from the Double Diamond. By using Design Thinking the gap between both methodologies will be bridged. The steps taken to do so include an analysis of the problem through a literature review, a multiple model analysis and expert interviews. With this information a theoretical framework will be proposed that is used to brainstorm and iterate between theory and practice to develop a support tool providing insights for start-ups. This tool will be tested with a focus group and product developers from sustainable start-ups. After the tool has been tested with the target group, the conclusion, discussion and recommendations are presented. Essential in all steps of the methodology is the iteration between theory and practice, finding the best balance between both theoretical accuracy and practical workability.

The tool presented in the study is a design for sustainable behaviour change tool. The tool includes the three behaviour constructs determined by the literature review: attitude, social norm, and efficacy. These constructs are linked to nine behaviour barriers: limited cognition, scepticism, motivation, social opinion, herd behaviour, mistrust, too distant, perceived control, and autonomy. For each barrier there are two influence mechanisms selected that help overcome the specific barrier. For each mechanism, the tool suggests design tweaks that can be applied to create an effective message frame. The tool is accompanied by a booklet with additional information, tactics and examples. My proposition is to use the tool in a guided session with an experienced moderator. This way, the goal of the tool, to offer new insights to product developers and start a conversation rather than provide tweaks, will be achieved better through engagement and education through collaboration. The tool test showed that start-ups are very interested in applying the influence mechanisms, but are most keen on getting guidance in their message framing process and using the tool in discourse.

In conclusion, using a combined DBR and Double Diamond approach centralised around iterations between theory (literature) and practice (behaviour expert, designers and start-ups) resulted in the development of a both accurate and workable tool. This tool will hopefully offer start-ups insights into effective message framing design to stimulate sustainable consumer behaviour change.

The main recommendations for future research is to use this preliminary tool as starting point for more interdisciplinary research between human behaviour, environmental barriers,

and message framing for behaviour change to improve the validity of the tool. Integrative research could not only improve knowledge on the separate elements, but also on the causal relationships between the constructs, barriers and influence mechanism. In later research, design tweaks can then hopefully also be validated and connected to the influence mechanism. I believe that it is with the integrative research and the testing its outcomes in theoretical and practical situations that we can develop more support systems for start-ups to develop for pro-environmental behaviour change and ultimately a more sustainable society.

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1. Pre-phase

1.1 INTRODUCTION

“Awareness of climate change has been raised, information has been provided, advice has been given, but acting on it in this context is a difficult decision to make for individuals, communities, and governments around the world”

(Nerlich et al., 2010, p101)

SUSTAINABLE DEVELOPMENT AND BEHAVIOUR

BOTTOM-UP

To combat the effects of global climate change the Dutch national government has developed a climate policy centralising bottom up development (Kamp & Mansveld, 2013). In this policy, the government calls out to local municipalities and businesses to develop and pursue their own climate policies, focusing on sustainable housing, energy-efficient transportation, and waste reduction. According to the Dutch government, the sustainable transition should be led by the industry, where businesses take responsibility in sustainable change (Ploumen & Kamp, 2013). However, policymakers have so far not been able to implement enough practical policies for fast enough change. According to the government,

Innovations are the key to effectively reaching the national climate goals and it is the companies that innovate that will power the sustainable transition (Kamp & Mansveld, 2013).

For businesses taking part in sustainable change is not only a technical problem needing to be solved, but also a social-technical problem (Ministry of Economic Affairs, 2016). If businesses want their sustainable bottom-up innovations to thrive, they need to be able to change consumer's mindset to stimulate pro-environmental behaviour. But people are emotional and irrational beings, predicting their behaviour and changing their course of action is not a simple task (Ariely, 2010).

MULTI-LEVEL PERSPECTIVE

There are many businesses that strive to contribute to the Dutch transition towards sustainability. The focus of this thesis is primarily on supporting businesses that are centred around disruptive sustainable innovations in understanding how to work with this human irrationality. I've discussed the necessity of bottom-up development, and to justify which businesses are at the bottom I want to address I want to refer to the Multi Level Perspective by Geels. He argues that apart from advances in technology, there is a similar dependency on social adjustment to foster technological transitions (Geels, 2002). The Multi Level Perspective shows that a full transition is caused by interaction between three levels: niches, regimes and landscapes. The landscape is the macro-level context in which the developments cause long-term change. Within this landscape regimes nurture developments and technologies to create these macro-level changes. Regimes are the mainstream and high-level structures in which innovations become the new 'normal' (Geels, 2002). Before maturing in the regimes, innovations start in the niche spaces. Niches provide small-scale spaces for disruptive innovations that are not yet competitive enough in a regime level. In these niche networks the innovations are less bound by existing social norms and rules, allowing their development to increase acceptance (Smith et al., 2010). Once an innovation has been established in their niche and developed a network for growth, they enter the regime level, where the innovation is embedded in the social and technical 'rules' of the economy. So, regimes act as the selection environment for innovations in the niche. Innovations mature at the regime level, and can ultimately contribute to a change in landscape.

Start-ups

A change in landscape can create pressure at the regime level which creates openings for new innovations at niche level (Geels, 2002). When combining the interpretation of the

Dutch government's environmental objectives and Geels' multi-level-perspective it can be concluded that support needs to be provided at niche level, right where start-up can be found. Figure 1 shows how this conclusion translates to the choice of start-up in the Multi Level Perspective model. For this thesis, this translates to the national government wanting to transit to a sustainable economy (landscape level), pressuring industry (regime level) to allow for small disruptive innovation to establish themselves by getting opportunities to grow (niche level). I will focus on the businesses that foster small disruptive innovations that need help in growing. Start-ups are typical businesses that works on disruptive innovations.

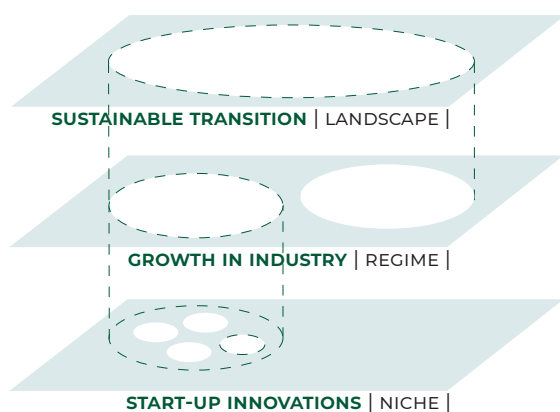


Figure 1 - Thesis specific Multi Level Perspective model, obtained from Geels (2002)

However, start-ups lack capacity (for example in manpower, knowledge or finance) to dig into consumer psychology. If they could be provided quick tools that take account for psychological consumer factors in the development of their innovation, they can exit the niche level quicker to reach the regime. According to entrepreneur and Silicon Valley start-up expert Steve Blank (2011), start-ups are different from other small businesses because they strive for a scalable business model that will quickly impact the current market. It is this drive that is necessary to ultimately change regimes or landscapes. By focusing on the start-ups and increasing their knowledge and understanding on behaviour change my research can help start-ups grow in the niche level. The decision on specific start-ups and how they have been incorporated in the study can be found in Chapter 2.1.

BARRIERS AND BEHAVIOUR

Research shows that it's not necessarily a limit in opportunities, but individual barriers that inhibit sustainable behaviour change (Gifford, 2007; Kollmuss & Agyeman, 2002; Melchior, 2018, personal interview). Barriers are different per person, but the result of barriers is most often inaction and thus forms a first problem to behaviour change for sustainability. In the early days of designing for behaviour change the common view was based on *the deficit model*. This model originates from the belief that a lack of knowledge is the greatest barrier to change and filling this gap of scientific literacy should suffice to get people to change their behaviour (van der Sanden & Vries, 2016). Since the end of the 1950's, however, research on the effects of human psychology has steadily increased (Bonnes & Carrus, 2004), revealing that human behaviour change is much more complex. Behaviour, which will be addressed more specifically in Chapter 3.1, is a constant expression of cognitive habits and routines formed by beliefs, understandings, culture, upbringing and training (Heimlich & Ardoin, 2008; Steg & Vlek, 2009; Vercauteren, 2013),

There is a plethora of research promoting the importance of both conscious, but also unconscious determinants affecting behaviour change (Aarts, Verplanken, & Knippenberg, 1998; Chong & Druckman, 2007; Dijksterhuis, 2007; Kahneman, 2011; Kollmuss & Agyeman, 2002; Lakoff, 2010; Tversky & Kahneman, 1981) People rely on their unconscious mind 95% of the time (Kahneman, 2011), suggesting most of what we do is not as conscious and rational as once thought. "A wide variety of factors influence environmental action. These can be characterized as environmental and social values, situational factors and psychological variables" (Barr, Building, Drive, & Ex, 2003, p. 229) Most of the situational factors fall outside the scope of this study because they address facets of the external context that are hard to control from an individual perspective and through this thesis' study, but the social psychological values are addressed in more detail in Chapter 3.1 and 3.2.

MESSAGE FRAMING DESIGN

Although the Dutch government started advocating sustainable change from bottom-up, there still seems to be limited understanding and applications of sustainable unconscious behaviour change theories in sustainable businesses (Gagestein, 2018, personal interview; Zaltman, 2003). “The managerial tendency to focus on conscious consumer thought, while understandable and natural, also blocks managers’ access to the world of unconscious consumer thought and feeling that drives most consumer behaviour” (Zaltman, 2003, p. 51) One way to get people to change to more sustainable behaviour is through effective message framing design. However, there is no one-size fits all (Heimlich & Ardoin, 2008; Nerlich et al., 2010; Vrijer, 2017; Zachrisson & Boks, 2012), and determining what framing technique can be successful in what situation is difficult. Offering insights in effective message design can increase understanding on what inhibits sustainable change.. It is by the application of this knowledge that we can help to change people. As Zacharisson & Boks (2012, p. 51) put it:

“Understanding reasons for behaviour has been the topic of extensive research across multiple disciplines...but the level of applying this body of knowledge in a design for sustainable behaviour context is so far limited.”

An expansion of methodological guidance on message design can improve message framing for sustainable bottom up change (Magee et al., 2013; Nerlich et al., 2010). We need to know what motivates or inhibits individuals to change (Monroe, 2003). There are many innovations that facilitate pro-environmental behaviour, there’s a lot of research on behaviour change models that provides insights in human behaviour, and design for interaction offers tweaks on how to design for consumers. I approach these three research areas all as part of larger knowledge fields: industrial ecology (pro-environmental behaviour), social psychology (behaviour change models), and industrial design (user experience design). Figure 2 shows the areas in their research field and shows the overlap. It is at the point of overlap that my study is performed. By learning how people behave, designers can achieve more meaningful and effective quality of design (Mayer, 2009). The overlap between these areas is not unexplored territory, but I wish to contribute by combining multiple knowledge fields both in terms of theory as well as practice. Or, as Cuevas et al (2012, p. 63) nicely states, that it is worthwhile to integrate “different perspectives to achieve greater theoretically significant outcomes arising from the synergistic activities of multidisciplinary research”.

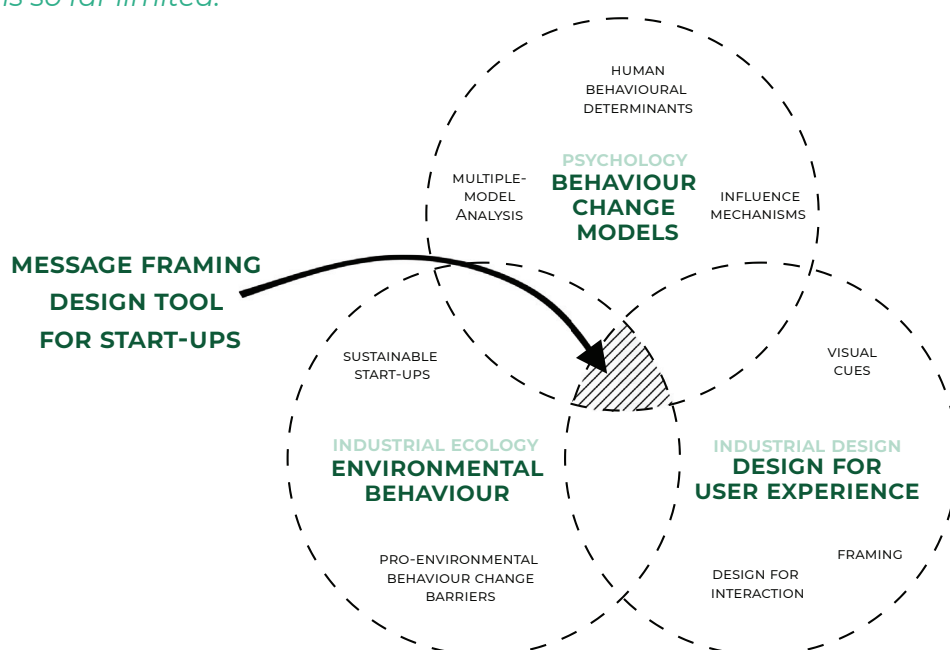


Figure 2 - The integration of research areas for this thesis

1.2 PROBLEM IDENTIFICATION

PROBLEM IDENTIFICATION

To reach the Dutch climate goals, change is required. The government emphasises the need for business innovation and bottom-up change (Ploumen & Kamp, 2013). If people invest in sustainable innovations they experience personal barriers that have to be overcome. If they are not overcome, the result can be sustainable inaction. Humans are predictively irrational, making it difficult to predict and analyse their behaviour (Kahneman, 2011), but through effective message design these barriers can be overcome. Four sub-problems make up the problem identification of this thesis:

'People intuitively do not want to change (1). How people can be changed and what inhibits them from showing sustainable behaviour is a complex phenomenon (2), often triggered by irrationality and numerous underlying determinants. Older models on sustainable behaviour change are not always effective (3) and it is hard for developers to know what practical steps (4) they can take to design for more effective behaviour change.'

This study addresses these problems and by connecting the different research areas attempts to offer insights in how to design for effective consumer behaviour change. With a background in industrial design, science communication, and industrial ecology I combine my knowledge to dive further into finding synergies between these fields to resolve the problem stated above. I see great value in interdisciplinary integration because it provides a multi-vision problem analysis, acknowledges complexity, and offers a more complete solution or set of tools due to the contributions from different disciplinary backgrounds (Uiterkamp & Vlek, 2007). The

deliverable of my study will be a *support tool*. I see a tool as a document providing support in how to take further steps to reach a certain goal. The form of the tool will be determined throughout this study and based on what kind of support start-ups need in practice, and the integration of theory. My hope is that with this preliminary integrative study I will develop the tool in a way that it offers practical assistance in the complexity of effectively framing a message for sustainable consumer behaviour change. With *message framing* I mean the designing of any type of content, offline or online, that is intended to trigger consumers to engage with the presented product or service. This can be through flyers, websites, posts, emails, videos or even during discourse. Therefore, the tool will be aimed to provide insight for start-up with B2C purposes. With this tool I hope to engage people by starting the conversation about barriers to behaviour change and mechanisms to overcome this through message framing. Even more so, I hope the tool can ultimately help messengers to frame comprehensive, inclusive and manageable design interventions for sustainable customer behaviour change. Having said that, the aim of this thesis is to:

'Develop a tool that offers insights in message framing for behaviour change to improve communication towards customers.'

To reach this aim, the tool will be based on the integration of behaviour change models (psychology), environmental behaviour (industrial ecology), and design for user experience (industrial design).

Chapter 2 provides more detail on the research approach taken to achieve this goal.

RESEARCH QUESTION

To support this aim, a general research question is formulated, followed by sub-questions that elaborate upon important elements. The questions are formulated below. Although five sub-questions might seem like a lot, they are simply a division of all the elements that need to be researched in order to develop a tool that fulfils the aim of this study. Together the sub-questions include all the pieces to the main research question.

MAIN QUESTION

How can behaviour change models, environmental behaviour barriers, and influence mechanisms be integrated into a tool that offers start-ups insights into message framing for sustainability?

SUB-QUESTIONS

1. *What are the main psychological constructs that make up human behaviour?*
2. *What are the psychological barriers that inhibit changing to more pro-environmental behaviour?*
3. *Which influence mechanisms are identified by both theory and practice that can overcome the identified barriers?*
4. *How can design tweaks be linked to influence mechanisms to improve message frame design?*
5. *How can the iterative approach of this study contribute to finding a balance in the tool's theoretical accuracy and workability in practice to support inexperienced product developers?*

RELEVANCE FOR INDUSTRIAL ECOLOGY AND SCIENCE COMMUNICATION

With a focus on integration, this study addresses both Industrial Ecology (IE) as well as Science Communication (SC) related research. In recent years IE research shifted from a more resource based orientation to a systems thinking approach. This systems thinking approach is necessary to make the transition to a sustainable future. To power this transition, change is required. Not only in ecology or industry, but also in society. As discussed in Chapter 1.1, disruptive innovations need to grow from a niche to a regime level to ultimately change the landscape. If start-ups take the psychological factors of behaviour change into account, the chance that their disruptive innovation moves up from the niche level increases. This study is aimed at sustainable start-ups and is therefore very specific. But, by being this specific a relevant contribution is made in helping start-ups grow quicker. And if start-ups can manage to scale up quicker, their contribution to the larger transition increases, which aligns with the systems thinking approach of Industrial Ecology.

One of the focus areas of the Science Communication research agenda is responsible innovation through interdisciplinary research. The complex problem described asks for a mixed method approach, consisting of Design Based Research and the British Design Councils Double Diamond. I will bridge these methodologies through Design Thinking. I will explore where theory and practice cross boundaries and how this integration leads to a tool that supports message framing design as a start-up communication method. I will thus develop a tool that can improve communication to the public and makes knowledge available to again support a bottom-up transition.

Additionally, by integrating design into both IE and SC, I can offer a new perspective on the integration between these two discipline fields to strengthen practical implications and show the value of doing a joint degree.

2. Approach



2.1 APPROACH

A traditional design cycle includes a problem analysis, idea synthesis, simulation of possibilities, evaluation of ideas according to prior set criteria, implementation, and an evaluation. Where necessary, a re-design can be developed (Roozenburg & Eekels, 2003). This process is applicable to most design problems, but for more complex design problem such as the problem described in the this study, it seems worthwhile to explore more elaborate approaches. We can speak of complex problems when there is sociological uncertainty about outcomes and difficulty in defining a single problem (van der Sanden & Vries, 2016). To solve such problems there are no simple rules and there is never one clear solution. This thesis is no different because of the interdisciplinary character of this study. Another complexity is that this thesis focuses on the uncertainty of the unconscious and irrational mind that steers human behaviour. The study in this thesis starts with analysing the dilemmas presented in the problem definition. It then identifies the main elements necessary to overcome environmental behaviour inaction, and integrates these into a tool that supports start-ups to design for consumer behaviour change. With this integration, I then hope to contribute to theory whilst offering a solution to implement theory into practice via a design support tool.

of four stages. I will continue to refer to these different terms throughout the report to show the distinction in the overall approach.

DESIGN BASED RESEARCH

To guide this research, I use the Design Based Research (DBR) methodology. DBR aims to bridge the gap between theory and practice, using theory to design necessary interventions and develop these further in collaboration with participants from practice (DBR Collective, 2002; V. Der Sanden & Meijman, 2012; Wang & Hannafin, 2005). The typical DBR process is presented in Figure 3.

This thesis evolves around human behaviour and how message framing can affect this behaviour. Because human behaviour in real-life is central in this study, it seems suitable to look beyond only theory because “education research that is detached from practice may not account for influences of contexts, the emergent and complex nature of outcomes, and the incompleteness of knowledge about which factors are relevant for prediction” (DBR Collective, 2002, p. 5) I will do so by switching back and forth between theory and practice. Apart from switching, another characteristic of DBR involves making multiple iterations

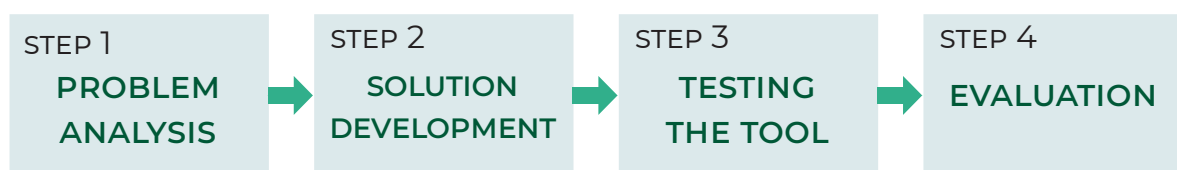


Figure 3 - The typical Design Based Research approach

In this chapter I will elaborate on the research methodology chosen for this study. As will show, the foundation of the methodology for this study consists of a *combination of a research methodology and design method*. The first will be the *Design Based Research* methodology containing four steps, and the second will be the *Double Diamond* method consisting of

throughout the process (Orngreen, 2015). As DBR “advances design, research and practice concurrently...possessing synergistic relationships among researching, designing and engineering” (Wang & Hannafin, 2005, p. 5). it seems like a suitable methodology for this thesis’ integrative study. Another advantage of using a DBR methodology is that it includes

interacting with the target group, revealing their true behaviour and experiences. Without target group participation the risk is that the tool developed to interfere with their behaviour is too much based on theory and does not fulfil its intentions in a real-world context (Reeves, 2006; Wang & Hannafin, 2005). By taking a DBR methodology the chance of this risk occurring will be decreased. DBR consists of four steps: problem analysis, theoretical framework development, test of solutions in practice, and reflection as seen in Figure 3.

DOUBLE DIAMOND

The DBR methodology will guide the process of this study, focussing on iterations between theory and practice. But I also want to “connect theory and practice by being explicit, by

that there are two diverging and converging phases giving placing emphasis on discovering the problem as well as developing a solution. Taking the problem as a central part of the design cycle, not as preliminary research, keeps the problem definition malleable and open to new insights. This allows for a continuous growth of the problem comprehension, and diminishes possible faulty assumptions that hinder effective solution design (Design Council, 2007). In the first diverging and converging phase (Discover and Define) I will explore the problem and selects elements that can answer the first three sub-questions. This includes the identification of elements that serve as input for the model development. For this, I will refer to literature, conduct interviews with experts and propose an initial theoretical framework. The framework will consist out of the selected elements and their determinants.

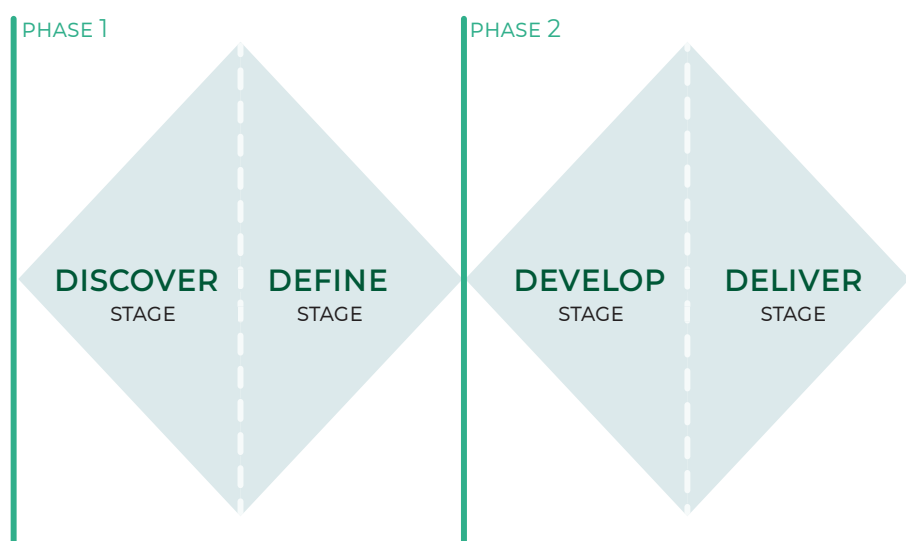


Figure 4 - The typical Double Diamond approach as defined by the Design Council (2014)

reflecting on what I am designing and making possible solutions concrete” (van der Sanden & Vries, 2016, p. 134). Therefore, I have chosen to also apply the Double Diamond communication method. This method, developed by the British Design Council, does not only focus on designing communication interventions as output, but it puts equal emphasis on the problem definition prior to designing the output. This double focus finds its existence in the shape of two design diamonds, as seen in Figure 4. The Figure shows

During the second diverging stage (Develop) I will try to answer the last sub-question by combining the elements into a workable tool for product developers. The balance between accuracy and workability of my tool is an important aspect during these stages. In this last stage (Deliver), I will converge to propose a final design for my tool. Test sessions with product developers from several start-ups will help to validate the workability of the tool. The end of the methodology presents future

design recommendations. Again, Figure 4 shows the two phases and four stages of the design cycle: Discover, Define, Develop, Deliver. A more elaborated explanation of how the phases integrate with the steps from the DBR approach is discussed in the next section.

INTEGRATING DBR AND THE DOUBLE DIAMOND

The DBR methodology in this study is supported by the Double Diamond method in each of the steps. In DBR focus lies on the theoretical quality of the tool (Wang & Hannafin, 2005). By integrating design into the methodology, I allow myself to get the best possible outcome for my tool for practical purposes as well as having the opportunity to contribute and reflect on the theoretical aspects of this study. As will become apparent, I've decided not to adopt all elements of the Double Diamond method, but only those that will bring more design in the DBR methodology. Figure 5 shows the general integration making up this thesis' approach. What can be seen in the Figure is that the stages of the Double Diamond are not all parallel to the steps of the DBR. This will be explained in the next section. To understand how DBR and the Double Diamond are combined in this study I will describe what literature states about each individual and about combining these two. This

section will also include the specific methods to support answering the research question and its sub-questions. These methods are shown in Figure 5 per DBR step. Again, to clarify, steps indicate the DBR approach and stages indicate the Double Diamond approach.

DBR STEP 1 – PROBLEM ANALYSIS

For the first step of DBR the practical problems at hand are analysed. They are approached from both a research and practitioners perspective (Reeves, 2006). During this step the problem is explored to gain more insights in each research field. By implementing the Discover phase from the Double Diamond, the scope is broadened even more, loosening the reigns on the initial assumptions, revealing new insights within the chosen scientific research areas (van der Sanden & Vries, 2016). Collecting as much relevant information as possible and finding key elements, areas and concepts that can be explored is central during this stage (Nessler, 2016).

With an abundance of information collected to solve the problem, the converging Define stage, focuses on synthesising. Central is the Define stage is to cluster the learnings, find relevant insights and create an overview of opportunities (Nessler, 2016). The result of this step is a problem statement as foundation for the development step (Reeves, 2006).

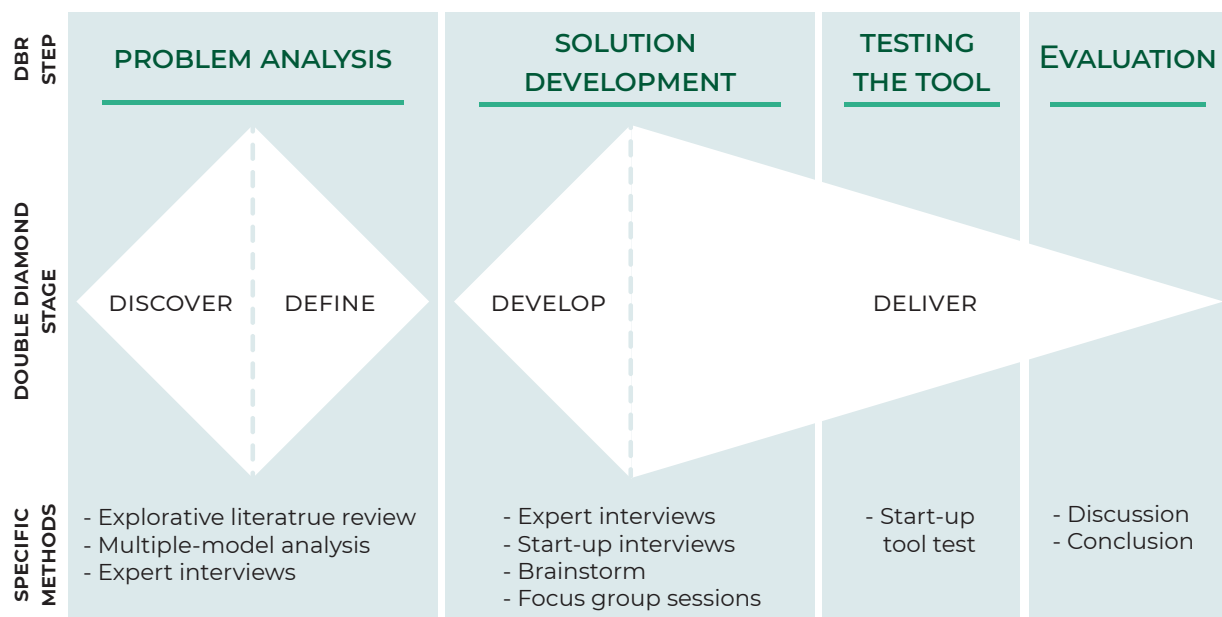


Figure 5 - The integrated research approach combining the DBR methodology and Double Diamond method.

DBR STEP 2 – SOLUTION DEVELOPMENT

Having defined the problem and having proposed a framework, this second step focuses on finding solutions to overcome the complex problem defined (Reeves, 2006). This step consists of multiple iterations that provide a constant improvement and refinement of the intervention (Bannan, 2013). During this step, involvement of participants is advised to “increase the chance that the intervention will indeed become relevant and practical” (Bannan, 2013, p. 20). The Double Diamond’s Develop stage that is integrated in this step concerns ideation of design opportunities (Nessler, 2016). Having created a strong framework with input, this ideation stage uses the framework to design potential solutions.

Before the next DBR step starts, the converging stage of the Double Diamond is initiated. In the beginning of this stage, and still during Step 2, all the ideas, iterations, and theoretical and practical input are brought together into a proposed tool as a solution to the problem statement. This stage is, thus, crucial to transform a literary framework into a workable tool.

DBR STEP 3 – TESTING THE TOOL

The next step of the DBR methodology evolves around evaluating and testing the solutions in practice (Reeves, 2006), aiming to conclude whether the proposed solution meets the pre-determined performance criteria (Bannan, 2013). In the continuation of the Deliver stage, the proposed tool solution is tested. To test whether this solution solves the initially defined problem, the solution should be prototyped and experimented with in one or more iterations (Nessler, 2016). This process will continue the conversion by learning from the tests and using this is the follow up tests to determine how the tool should be best use. Additionally, the tool test help with converging to discover the necessary important practical elements in using the tool, whilst showing what theoretical elements in the tool need revision. These results will be documented resulting in the presentation of overall findings.

DBR STEP 4 – EVALUATION

The last step of the DBR contains a reflection upon the process and a discussion on the process will be presented. One result should be a practical tool, and the other should be a contribution to theory (Bannan, 2013). During this step the Double Diamond ends. During the end of the last Deliver stage the final tool is reflected upon.

FROM RESEARCH TO DESIGN AND BACK

Combining both method has consequences. The problem at hand is complex and therefore I have deliberately chosen use to multiple methods. DBR is research focused and based on literature that has proven its value (Bannan, 2013). The Double Diamond method is based on taking specific design steps (Reeves, 2006). Since I focus on delivering a tool that can be used in practice, I see the design steps as necessary to improve the product. I am, however, aware of the possible subjectivity of the output. For my research I, therefore, intent to use as much input from others to justify these design steps, to avoid personal bias. I will do so by referring to expert opinion about the literature and their experience in years of practice.

I will try to make explicit where research (theory) ends, design (and practice) starts, and where they sometimes overlap. To improve comprehension of the process, I identify these crossing points to guide the reader when a research interpretation is suitable and when a design interpretation is preferred.

An overview of all crossing points is visible in Figure 6. Additionally, each chapter begins with a summary of the next steps of the process by presenting a reading guide containing the crossing points that will appear in that specific chapter.

ITERATION ROADMAP

The following roadmap (Figure 6) shows the main iterations taken and the switch from research to design, where there sometimes is a clear switch a sometimes an overlap. At several significant points, numbers are shown and explained on the right. For a detailed roadmap

see Appendix I. The blue text below indicates research-related activities, and the green indicated design-related activities to show the interaction the crossing points between research and design, showing the important of the interaction of both for this study.

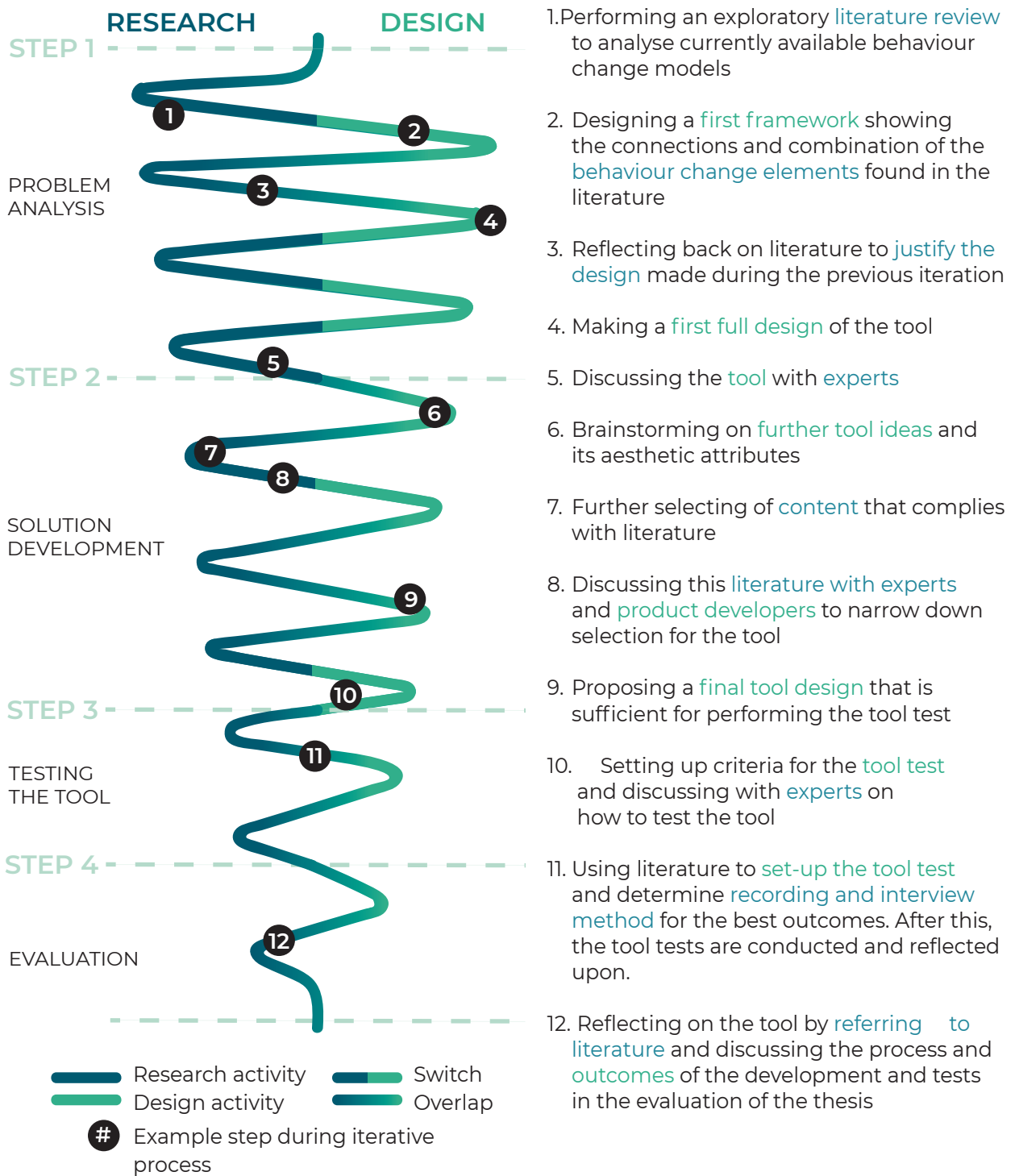


Figure 6 - Roadmap of iterations between research and design

THESIS SPECIFIC APPROACH AND MIXED METHODS USED

The rest of this chapter explains the integrated methodology for this thesis with the specific methods used in each step. For simplification reasons, not every iteration is discussed in the methodology. Although, these iterations are crucial for the process, and will guide the development process. For example, theory indicated that there are 29 barriers to pro-environmental behaviour (Gifford, 2011). But, these are too many barrier for people to process easily. So, by stepping away from literature and asking experts who have practical experience for advice these barriers can be narrowed down to a more fit-for-purpose set. The choices made to determine what barriers need to be included in this set and how they should be formulated product developer interviews and focus group sessions are conducted. The product developers and focus group participants are tested on their understanding and can then result in changes in the way some barrier terms are formulated. These new terms and choices can then be compared to existing literature again to protect the validity. This shows how a combination of research (theory), and design (practice) can add value to the overall account taking of multiple perspectives throughout the process. Therefore, a more elaborate step-wise description of the iterations and the crossing points throughout this process is presented in Appendix I. To see the iterations during the process over time see Figure 6 for an indication. In the rest of this chapter each individual step is discussed again, but this time thesis specific and including the specific goal and mixed methods used to complete that specific step.

DESIGN THINKING

In order to bridge the two theories, a *design thinking* approach will be applied. Traditionally, designers focused only on improving the functionality and appearances of products (van der Sanden & de Vries, 2016). However, wicked problems that cross boundaries between multiple research areas are in need of a more broadening design approach: *design thinking*. Design thinking includes consumer insights early on in the process to avoid basing decisions

on assumptions that block effective solution development (Brown & Wyatt, 2010). Rather, design thinking is:

"A complex thinking process of conceiving new realities, expressing the introduction of design culture and its methods into fields such as business innovation" (Tschimmel, 2012, p. 2).

Therefore, design thinking is more of a mentality, rather than an approach. It takes creativity, visualization skills and physical prototyping together with the consumer standing central in the process. Design thinking takes account of the final consumers, which suits well to the set-up of my study since I will include the consumer (the product developers of start-ups) throughout my whole process in multiple ways. Design thinker tend to use physical models such as sketches, diagrams and visual frameworks to explore, define and communicate (Brown & Martin, 2015). This makes design thinking even more suitable for this study, due to the design-related activities such as brainstorm and peer group sessions that are added from the Double Diamond to strengthen the DBR methodology. The process of the physical models are shown in the brainstorm summary in Appendix XII.

In this sense, using innovation as a learning for communication (van der Sanden & de Vries, 2016), design thinking will bridge the gap between the Double Diamond and the DBR methodology to get a grip on how to design for innovations. Design thinking will strengthen the analytical DBR approach by connecting design steps to it that take a wider perspective than only appearance and functionality. This way the gap between DBR theory and Double Diamond design is bridged in this thesis. Design thinking also supports the back and forth iterations and is, as a mentality, necessary for me to switch from research to design, but also contributed to my mindset at moments where both overlap (see Figure 6).

STEP 1 – PROBLEM ANALYSIS

Aim of Step 1:

Define which elements and accompanying determinants will be used as input for the tool.

Methods used:

Exploratory literature review, multiple-model analysis, expert interviews.

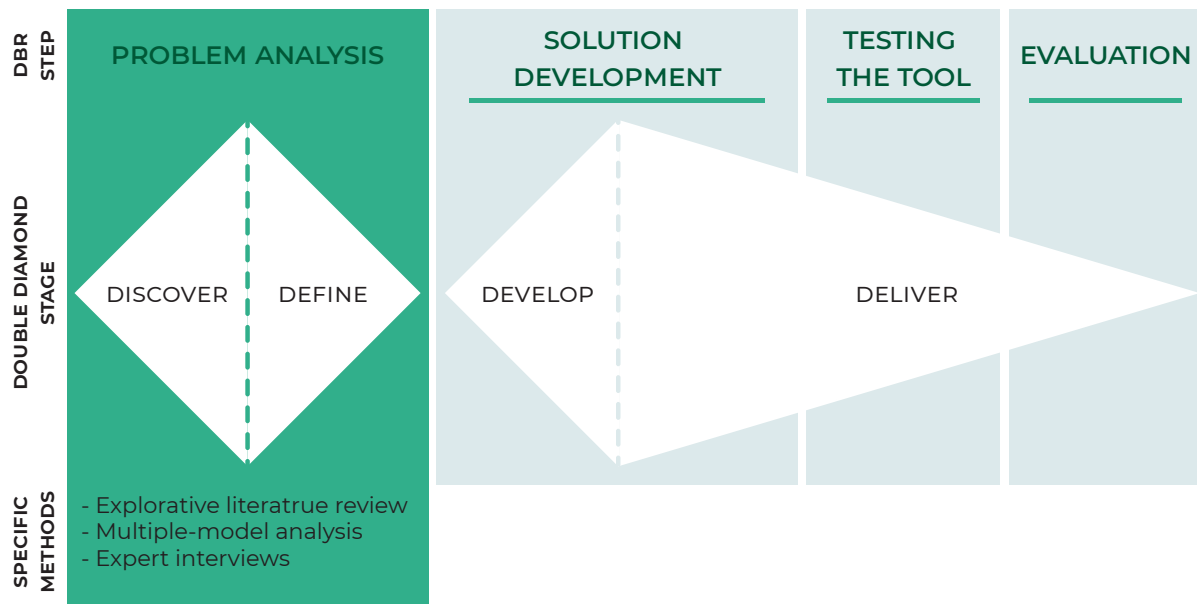


Figure 7 - Step 1 of the integrated DBR and Double Diamond approach

As can be seen in Figure 7, Step 1 of the DBR includes two Double Diamond stages. These are a diverging stage including the narrative literature review, followed by a converging stage using expert interviews to narrow down the results and force myself to get to the essence of what literature to take to the next step.

METHOD: EXPLORATORY LITERATURE REVIEW

Objective:

Explore literature available, select elements for in the tool, discover their determinants and select the most relevant determinants for each element.

An exploratory literature review seeks to “find out what actually exists in the academic literature in terms of theory, empirical evidence and research methods as they pertain to specific research topics and its related wider subject area” (Raju, 2013, p. 8) This type of review is often used to get a better understanding of the problem, rather than already seek for

conclusive answers. A benefit of using this type of review for my study is that it allows my to include studies with varying levels of depths and topics (Saunders, Lewis, & Thornhill, 2012), which suits well with the diverging stage of the Double Diamond.

For my review, I start with a broad topic search and then narrow down to dig deeper into specific subjects. The sources that will be consulted for the literature review are books, journals, conference proceedings, published papers, research dissertations, and published (governmental) reports. This flexible search lays the groundwork for further investigation of the research gap. A disadvantage of this method is that exploratory literature reviews are subject to bias because they require the researcher's interpretation of what is relevant (Saunders et al., 2012). Regardless, this reviewing method will help me to familiarize myself with existing theory on all three research areas: behaviour change methods, pro-environmental behaviour, and user experience design.

Exploratory Literature reviews on behaviour change methods

My intentions are not to generalize theories to directly draw a conclusion. By looking at the information available and then performing a multiple-model analysis with the selected models I want to avoid premature conclusion drawing, or basing my knowledge on only one existing model. By a multiple-model analysis I mean performing an analysis based on several behaviour change models that indicate which constructs make up human behaviour and which elements can be used to change people's behaviour. In the analysis I will compare what the models say and seek for similarities and redundancies that help to define the important constructs for my study in the research field of social psychology.

For finding relevant theory and models I started with the search terms "behaviour change", "communication", and "framing". Sometimes I combined the terms with "sustainability" or "sustainability". From here out a snowball approach is used. This approach starts with several reliable papers and then continues the search by using other papers referenced by these paper (Groening, Sarkis, & Zhu, 2018, p. 1850). Special attention is paid to review papers containing multiple models that are interesting to include in the multiple-model analysis. To expand the search, I also tried out other search terms. For example, I replaced "sustainability" with "environmental", "green" and similar terms. As for "framing", this was replaced by "nudging", "priming" or "message design". Additional sources, such as books, conference papers, public reports or governmental publications were also consulted. The selection of models for the multiple-model analysis and the analysis itself can be found in Chapter 3.2, and Appendix VI. In general, the analysis concerns a selection of behaviour change models to deduce the important and frequently appearing concepts concerning human behaviour. This review and the multiple-model analysis help to answer part of the research question, as well as a lay a preliminary foundation to answer sub-question 1 on the selection of behaviour change models.

Exploratory literature review on pro-environmental behaviour

The exploratory literature review on pro-environmental behaviour is aimed to discover which factors cause or drive sustainable inaction. To find literature, search terms include "sustainable behaviour" and "barriers". To expand the selection "sustainable" is replaced by "pro-environmental", "green", or "conscious". "behaviour" replacements are "inaction", "performance", or "attitude". Lastly, "barriers" is replaced by "limitations", "drivers", or "inhibitors". This will result in possible outcomes for usable behaviour factors. Another benefit of exploratory reviews, that is useful for this review, is that it helps to determine the direction of the consecutive step (Kultar, 2007). A popular next step is to increase insights through unstructured interviews. So, to expand on the reviews findings, I will take this advise and conduct unstructured expert interviews, which I will discuss later in this section. The criteria for the selection and the results of the review on pro-environmental behaviour can be found in Chapter 3.3. This review on pro-environmental behaviour answers sub-question 2 about psychological determinants that inhibit sustainable behaviour change.

Exploratory literature review on user experience design

Because ultimately I want to make a connection between the research fields of behaviour change models, pro-environmental behaviour and the application of design tweaks for practical message framing, exploring what design tweaks are available is the goal of this part of the exploratory review. The most important contribution of the design tweaks is the practical implementation and the applicability in message framing design. So, the starting point for this search are books written on design by design and framing experts. The selection criteria and the outcomes can be found in Chapter 3.5. This review will help to answer sub-question 4 about identifying message design tweaks.

METHOD: MULTIPLE-MODEL ANALYSIS

Objective:

Determining which main constructs are essential in human behaviour change, and where there is overlap between how to address these constructs to practicality behaviour change mechanisms.

As I have introduced, the exploratory literature review for behaviour change models will result in a list of papers and theories on models that offer constructs essential in behaviour change. To determine where there is overlap between these models, how the constructs are connected in the models and to what extent I can comprise the overlap into usable constructs for this study, I will perform a multiple-model analysis. I will elaborate on this analysis in Chapter 3.2 because the multiple-model analysis method is part of the literature review.

METHOD: EXPERT INTERVIEWS

Objective:

Explore information available from a practical perspective on each element of the tool, and to validate and support selection of determinants for each element.

Conducting expert interviews are essential in the DBR process and as addition to the exploratory literature review. The interviews conducted in this study are conversations with experts to gain more insights in the different research fields. This will be done through semi-structured interviews, which have as benefit that although there are some guiding questions determined, the interviewer is allowed to go off track when the experts reveals new information or potential interesting side trajectories (Cohen & Crabtree, 2006). Appendix II shows the exact interview guide. The questions concern the identification on the most important behavioural barriers, and which mechanisms there are to overcome the described barriers. By allowing the semi-structured interview to be executed as a conversation guided by several general questions to fall back on, there is room for the interviewer to let the experts elaborate and go off track to be offered new views of the

literature based on the experts' opinions. This makes semi-structured interviews suitable to reach the goal of diverging as much as possible. By refraining from pushing the expert into complying with the results from the literature review, I leave them the freedom to refrain from choosing between pre-picked options. When a term then appears in both the review and the interview its validation value is increased. This way, the interviews can provide valuable justification as well as comparable data (Cohen & Crabtree, 2006). A weakness of semi-conducted interviews is that they depend on the skill of the interviewer, which can result in misinterpretation of the answers provided or unintended steering. Also, even without this weakness, analysing data and determining the validity and truthfulness of the answers is difficult in semi-conducted interviews.

It should be noted that all interviews were conducted in Dutch. However, the quotes presented in the report are translated to English and can therefore provide a discrepancy between intention and translation, but translating the quotes is considered necessary for to avoid incomprehensibility due to a language deficiency of non-Dutch speakers.

Interview structure

The interviews have two objectives. Firstly to explore the pro-environmental behaviour factors relevant for the tool, and secondly to justify findings from the multiple-model analysis from an expert point of view. Where possible, the interviews are conducted face-to-face. Due to practical constraints, some are conducted over the phone. The interview guide for the experts and designers consists of several topics with guiding questions. Appendix II contains the whole guide including possible questions that can be asked if the interview need additional input, but the topics, questions and the goal of the questions that will be asked every interview follow.

Questions behaviour experts:

1. What steps are necessary to take to design for behaviour change?
Goal: Find out which elements are important to change behaviour at a mental as well as practical level.
2. What are the most important drivers and/or barriers to sustainable behaviour change?
Goal: Find out whether drivers or barriers are mentioned more, which ones are mentioned and what other resistances people experience in changing behaviour.
3. Looking at each individual barrier, which influence mechanism(s) can be used to overcome these barriers?
Goal: Make a first connections between barriers and matching influence mechanisms.

Questions for designers:

1. How do you approach a design process with specific behaviour change as goal?
Goal: Discover how designers approach message framing for behaviour change from a design perspective.
2. What is important in designing a tool that support non-designers in a design process?
Goal: How do designers develop, use, and reflect on tool design, and what elements are necessary to make a tool effective.
3. Which design tweaks do you use for effective user experience design?
Goal: Find out if designers have a standard set of tweaks, how they decide with what to incorporate in the design and how much they know about designing for behaviour change.
4. How do you set up a focus group session for the development of a design tool?
Goal: Get new insights and experiences on effective focus group sessions and set-up.

Expert selection

There were three types of experts consulted to be able to address all topics: behaviour change methods (framing experts and behaviour experts), pro-environmental behaviour (behaviour experts), and user experience design (designers). Because it depends on many factors that again are subject to opinion there is no established number of interviews where the saturation point is reached (Bowen, 2008). Therefore, it is difficult to determine what the saturation point is for the number of interviews. For practical reasons the number on behavioural expert consulted in this thesis is between 4-10 behavioural experts, based on numbers suggested by van Boeijen, Daalhuizen, Zijlstra & van der Schoor (2013). Because attractive design is subjective, and I want to avoid mixed messages on the aesthetics of the tool design, I do not want to interview more than two designers. Several criteria to narrow down the expert selection are as follows:

- The expert must have a (study)background in their field of expertise¹.
- The expert must be connected to or working at an established institute or company involved in behaviour change.
- The expert must have experience in practice with implementing behaviour change mechanisms with citizens or companies.
- At least one expert must have sustainability or pro-environmental behaviour as expertise field to be able to link knowledge to the pro-environmental research field.

To comply with the features of the diverging stage of the Double Diamond, it can add value to seek a variety of expertise. Therefore, I keep the criteria to a minimum and approach both experienced and less experienced experts both from a research and commercial backgrounds. Appendix III shows a list of all participating experts and their background.

¹ For behaviour experts: (social) psychology, behaviour change, behavioural economics. For framing experts: human communication methods, linguistics, framing. For designers: Industrial design, user experience design, strategic product design

STEP 2 – SOLUTION DEVELOPMENT

Aim of Step 2:

Use the outcomes from Step 1 to develop a tool that can be tested with the target group.

Methods used:

Follow-up expert interviews, start-up interviews, brainstorm, and focus group sessions.

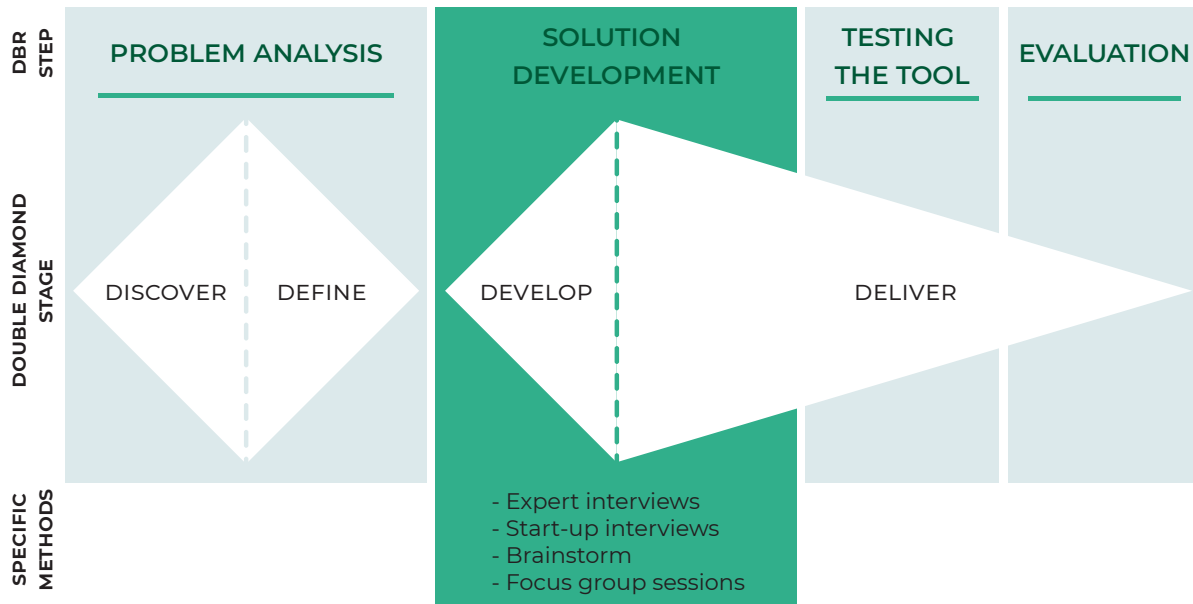


Figure 8 - Step 2 of the integrated DBR and Double Diamond approach

As can be seen in Figure 8, Step 2 of the DBR is again divided into two Double Diamond stages, but only the beginning of the second converging stage. The Develop stage includes start-up interviews and a brainstorm to develop tool ideas. The beginning of the converging Deliver stage includes expert interviews and focus group sessions to arrive at a final proposed tool design. Note: the actual process is more iterative than this, but the explanation given should be sufficient to show the process of how I arrived at the proposed tool. This representation of iterations as presented in Appendix II, gives the best summary of the simplified iterative process.

METHOD: FOLLOW-UP EXPERT INTERVIEWS

Objective:

To validate or co-decide which, by theory indicated, determinants are unmissable for the tool, and how to connect them to the elements with the best balance between simplicity and accuracy, whilst not compromising too much on accuracy.

Behaviour and design expert interviews are conducted (see Appendix III for the expert selection) to cut down the density of theory that will be used in the tool without losing its theoretical value. These interviews protect the validity and accuracy of the tool, but also help in making selections. Some of the outcomes of these interviews are obtained from the first interviews in Part 1, but in follow-up interviews more questions were asked. The benefit of the follow up interview method is that experts are obliged to apply their knowledge on the proposed tool design, preventing getting off topic. A limitation of interviewing the same experts again is that it inhibits a creative process by the experts to think of new possibilities to create a tool that is effective from a behaviour expert perspective.

Interview structure

These interviews are also semi-structured interviews. Again, where possible, the interviews are conducted face-to-face. In other interviews, the current tool design is shared and discussed over the phone. For these interviews several

questions about the tool are asked and reflected upon by the expert. The opinion of the expert is central and the level of agreement concerning the connections between the elements and determinants. Therefore, only several questions are used to structure the interviews:

1. Do the chosen behaviour constructs coincide with literature and your experience in practice?
Goal: To determine whether the foundation of the tool is accepted from a social psychological perspective and whether the constructs reflect the reality of human behaviour.
2. Do the chosen barriers and their connection to the constructs coincide with literature and your experience in practice?
Goal: To assess the barriers, see if there are missing barriers, and connect them to the chosen constructs.
3. Do the chosen influence mechanisms and their connection to the barriers coincide with literature and your experience in practice?
Goal: To ask which influence mechanisms overcome each barrier or link the prior chosen influence mechanisms to the barriers, and to assess whether the term chosen are accepted according to theory.
4. Do the chosen design tweaks and their connection to the influence mechanisms coincide with literature and your experience in practice?
Goal: To assess to what extent the experts are familiar with assigning design tweaks to influence mechanisms and how they would approach designing for change.

Expert selection

For the follow-up interviews the same expert selection criteria applied. For an explanation of the expert selection see section the method explanation in Step 1, or Appendix III for an introduction on the consulted experts. Again, these experts were either behaviour, framing or design experts from different expertise fields.

METHOD: START-UP INTERVIEWS

Objective:

To understand the current message framing process start-ups undertake, to determine their current knowledge base on the three research fields, and to discover their needs if they would be offered a support tool for their message design process.

As argued earlier in this thesis my tool will be aimed at product developers of sustainable start-ups (see Chapter 1.1). Larger companies often have resources to invest in research and development, but smaller companies do not. Because the tool I will develop is aimed at giving insights and starting conversation about message framing through unconscious behaviour mechanisms, I see the tool as most valuable for smaller companies that offer sustainable innovations. By starting at the bottom, and using start-ups as a target group, I can contribute to the bottom-up



DE ENERGIEBESPAARDERS

Image 1 - De Energiebespaarders logo

development by increasing the knowledge of start-ups. Additionally, I have the opportunity to spend time at a small start-up whilst conducting my study. This start-up is called De Energiebespaarders, and is focuses on offering private homeowner the support in renovating their homes. Being able to spend time at a start-up will allow me to observe the daily practices of the start-up and to shape an understanding of what start-ups like this one could present in the content of their consumer marketing. In continuation of this study I will refer to the start-up employees responsible for message framing, marketing, of consumer analysis, as the *product developers*. I do so because developing their service is often their main concern, and many employees that have become responsible for the marketing, design or sales do not necessarily have a background on this topic.

Interview structure

Again, for consistency purposes and to follow the diverging characteristics of the double diamond, the interviews will be semi-structured interviews. These interviews will consist out of three steps: questions on the start-ups consumer journey and approach, questions on their content marketing approach, and a conversation about their needs and how a tool could facilitate decreasing their knowledge gaps. By allowing the semi-structured interviews to move in different directions, I can develop a complete view on how the start-ups approach their consumers. Interaction and human behaviour is very important throughout this whole research. The advantage of face-to-face interviews with start-ups is that I can pick up on social cues such as voice, intonation, body language and attention (Opdenakker, 2006). Because of these cues, I can directly react on the situation, and create a good ambience, but also detect disinterest, doubt and other emotions. However, I must be aware that because of the personal interaction the participant might give socially acceptable answers, and it is difficult to analyse and generalize the findings. The interviews last 1-1.5 hours to be able to gain sufficient insights and answer all the questions, but to avoid losing the product developers attention. The main questions asked during the start-ups interviews are as follows:

Consumer Journey

- What do you know about who your consumer is and what their values are?
- Which activities do you perform to understand your consumer better?
- How do you monitor your consumers and their behaviour?

Content marketing

- How do you determine which marketing techniques and output sources to use?
- Which steps do you take in the process of designing the message content? Who is responsible for these decisions?
- To what extent do you analyse the effects of your message output?

Knowledge deficit and tool possibilities

- What knowledge do you lack about your consumer journey and marketing activities?
- How could you be helped to improve your message design process?
- If I would develop a tool that would help improve your message framing, what would you want the tool to include? How could somebody help you with your daily tasks?

Start-up selection

The term pro-environmental behaviour can be widely interpreted, and I want to refrain from specifying because a mixture of innovations is necessary for sustainable and durable development. Therefore, the types of start-ups that fall under the target group of my study will also be broad. To determine which start-ups to approach the following criteria apply:

- The start-ups must offer products that support pro-environmental behaviour or sustainable innovations. To clarify, with these terms I mean that the start-up must offer a service or product that either 1) actively contributes to a sustainable future by reducing waste, preserving valuable resources, providing a more sustainable alternative, stimulating green energy production, minimizing energy use, or reducing GHG-emissions, 2) stimulates conscious behaviour of their consumer, 3) has sustainability as an important value of their company identity.
- The start-up must sell a product or offer a service as a business-to-consumer concept. Because in designing for consumers specific behaviour and barriers play a different role than in companies, the tool will not be developed for business-to-business purposes.
- The start-up must offer their service online, offline is optional. Most of the design tweaks suggested are aimed at visual content design, and because most start-ups spread their consumer content online the start-up should at least sell their product and have consumer contact online.
- The start-ups should at a minimum be at stage in their business where they have

been in contact with their consumer, considered who their consumer is, and have already participated in some marketing activities.

For the list of all the participating start-ups refer to Appendix IV, and for the main findings of the start-up interviews see Chapter 5.2.

METHOD: BRAINSTORM

Objective:

Generate ideas for a tool, iterate to develop the design ideas and develop a final tool ready for testing.

By having selected all the elements necessary for the tool, their determinants, and information from experts and product developers it is time to generate ideas. This will be done through brainstorming. The objective of a brainstorm is to generate as many ideas as possible without being restricted by requirements and premature criticism (van Boeijen et al., 2013). According to van Boeijen et al (2013) brainstorming has four rules. During the design process I will follow these rules to get the best possible results:

1. There should be no room for criticism and unexpected solutions should be welcome
2. Stepping away from expected solutions is allowed
3. 1+1=3: combination where you built on other ideas can be very beneficial
4. Quantity breeds quality

These rules indicate that although the literature review and the determinant selection have been based on literary proof and expert validation, the brainstorm lets go of verifiable information. This gives me the opportunity to explore possibilities, seek for an understandable tool and use ideas without having to justify them, which again suits well with the diverging goal of the Develop stage of the Double Diamond approach. A summary of the brainstorm can be found in Appendix XII. I will follow the brainstorm action plan proposed by van Boeijen et al (2013):

1. Write down the problem statement and the elements that will be part of the design
2. Diverge from the problem, generate ideas and select the most promising ideas
3. Evaluate ideas further according to pre-set criteria
4. Converge through selecting ideas and develop further using the design criteria

A limitation in using a brainstorm method is that solving complex problems that contain specialised knowledge, in my case the accuracy of the theory presented, can be difficult in an open process like a brainstorm (van Boeijen et al., 2013). For my study, the last two steps of the action plan described above will be accompanied by the iterations and validations between experts, designer, product developers and the focus group sessions. This validation is necessary to overcome this limitation of brainstorming. The result of the brainstorm will be a wide variety of ideas, whilst keeping the desired theoretical accuracy and necessary workability for practical use.

The criteria for the tool

To develop and evaluate whether tool fulfils its aim, there are several criteria that it needs to comply with. More specified criteria concerning theoretical accuracy, workability and design are described in Chapter 5.1, in preparation of the tool test. The general requirements for designing a tool are described below, based on general tool development criteria described by Michie et al. (2011), but altered for the problem specific for this study:

- The tool should be applicable to every pro-environmental product or service provided by a start-up with a business-to-consumer purpose
- The tool should be coherent in the contents, meaning that the content of each category should show a similar level of specificity and belong to the same elemental 'level'
- The tool should not include very specific determinants in the same element level
- The categories should be logically linked together to provide easy access to understanding influence mechanisms

The proposed tool can be found in Chapter 4.2, an explanation of how to use the tool can be found in Chapter 5.1, and the accompanying booklet with explanations and examples can be found in Appendix XI.

METHOD: FOCUS GROUP SESSION

Objective:

Check chosen theoretical content on comprehensibility, develop ideas to increase the workability of the tool, and improve the design components of the tool with a group of participants educated on design and/or communication.

Including a focus group can improve idea development by offering new perspectives. Participants in a focus group can help identify difficulties, bring fresh ideas to the table and test preliminary designs. More specifically they “provide a quick overview of consumers’ opinions about a subject and insights into the opinions and needs of the target group” (van Boeijen et al., 2013, p. 51). The focus group sessions will be divided into multiple sessions. The first session will consist of a content check. The objective is to identify which terms and explanations are difficult to understand and how they could be rephrased. In the second and third session, as part of the iterative design process, the objective is not necessarily to develop new ideas, but the walk through the ideas and see which ideas work, how they can be improved and what design elements can be added to increase intuitive comprehension and tool workability. Each session will take approximately one hour and is only guided by addressing the main goal to allow free flow of ideas and critique. Collaboration is stimulated by the moderator through joining the conversation and asking questions to all the participants. Limitations of a peer group session can be that participants might give desirable answers, the group dynamic is determined by dominant people, and due to the small amount of participants the results can’t be generalized (van Boeijen et al., 2013). However, the purpose of my target group session is to get feedback from new input for the tool development, not to be conclusive about the success of the tool.

Focus group participant selection

A focus group often consists out the target group (van Boeijen et al., 2013). I deliberately choose a different group than product developers, because of the goals described in the brainstorm section. The idea of the tool is that is understandable for everyone and easy to use. However, since it can be difficult for people who are unfamiliar with working with design or communication tools, I use a focus group with participants more experienced with this. As the tool will be developed for a variety of product developers, the participant selection does not have to be very strict. The peer group will consist of four participants, complying to the amount suggested by Boeijen et al (2013). The criteria to select focus group participant are as follows:

- The participants should be familiar with working with either science communication models and tools, or with product design tools.
- The participants should have a background in either one of those fields at a university masters level

STEP 3 – TESTING THE TOOL

Aim of Step 3:

Test the proposed tool with product developers to evaluate workability of the tool and the balance between theoretical content and level of comprehension.

Method used:

Start-up tool test.

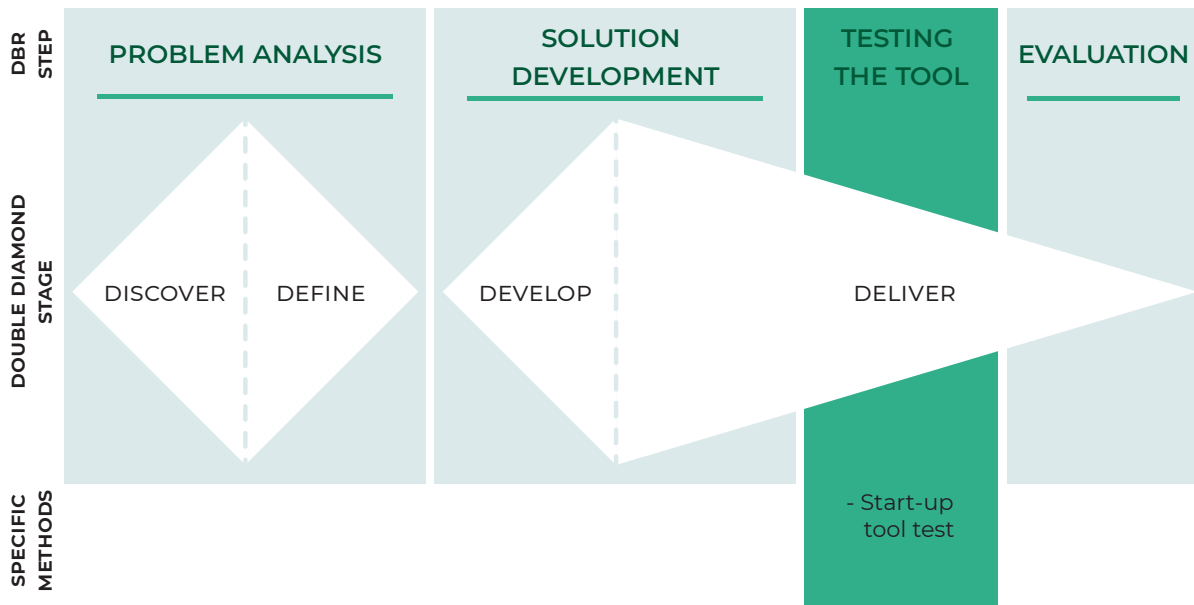


Figure 9 - Step 3 of the integrated DBR and Double Diamond approach

By several test sessions with different start-ups the tool will be assessed and implications for an improved design are given, as part of the continuation of the Deliver stage as shown in Figure 9. These test sessions aim to solve problems through “the creativity of designers and people not trained in design working together in the design development process” (Sanders & Stappers, 2008, p. 6).

METHOD: START-UP TOOL TEST

Objective:

To test whether the pre-set tool requirements are met and to define improvement for further tool development.

According to Bastien (2010) a tool test consists of the several steps: a definition of the goal of the test, a selection of participants, a list of tasks the participant is asked to perform, an explanation of how the data is recorded, the choice of the test, the product that will be tested, and communication of the results. I

will address all these steps, apart from the last step which is presented in Chapter 5.3, to fulfil the requirements for an acceptable test set-up. The aim of the tool test is to see how the product developers approach the tool, whether they understand the tool, see if they gain new insights and check whether the proposed tool criteria presented in Chapter 5.2 are met. Throughout the test I will pay attention to any difficulties in their understanding as well as confusion in the design. Based on feedback from product developer in a real-world context, the tool can both be further developed into a final proposed tool based on real-life iterations. There are several methods to test the tool, but I will be performing a product usability evaluation, which helps to validate the tool development choices made and to understand the quality of the tool in real-life situations (van Boeijen et al., 2013). The benefit of this evaluation method is that it allows me to discover “useful issues, possible improvements to resolve those issues and opportunities to improve the safety and

user experience” (van Boeijen et al., 2013, p. 133). However, this method also includes limitations. In performing the test sessions as a moderator, I run the risk of steering the participants in a certain direction or influence the test session too much. This is something to be aware of in preparation of and during the session. In the first session with the tool an experienced moderator will guide the session. The tool is used as a steppingstone and visual attribute to fall back on, not as a standalone tool, because in first use the tool can be difficult to understand. Due to the complexity of the information I expect that when start-ups get additional help during the tool use their understanding will increase and the effect of the tool will increase. As a good reflection of how the tool will be used in practice I therefore have decided to conduct the test as the moderator myself. However, participating and observing is a difficult combination of tasks, so therefore each test session will be recorded and reflected upon afterwards. This way I can both participate as the experiences moderator as well as reflect more objectively afterwards.

Tool test structure

The tool test will be performed in individual sessions with product developers from different start-ups. Each test will take about 1.5 hours and follows five general steps. The elaborate explanation of the step taken can be found in Chapter 5.3 about the tool test and the results. The general steps that will be taken are summarised below:

1. Introducing the tool prior to the session
2. Ask product developer to summarize their knowledge on their target group, and ask what kind of output message they want to discuss.
3. Shortly explain the tool. w
4. Start the session by letting the product developer read the tool description
5. Let the product developers use the tool without interfering
6. Start engaging to use the tool in a collaborative way
7. Evaluate the tool together

Start-up selection

The selection of start-ups that will participate in the tool test is similar to that of the start-up interviews. Because I am already aware of the current knowledge base of the start-ups and have aimed my tool development according to their knowledge, it is easier to validate whether the tool suffices as a support for their message framing design process. Because I do not intent to generalize any outcomes of this study, I want to stick of the same start-ups to at least be able to say whether the tool support their indicated needs, and my observations of their needs. According to Boeijing et al (2013), for a qualitative study between 4-10 participants is sufficient. To retrieve as much feedback as possible, but because of time constraints because I will perform all tests personally I will conduct 6 tests in total. For the participating start-ups refer to Appendix IV.

The test and result evaluation

The main goal of the tool test is to discover whether the chosen balance between theory and workability shown through design result in an easily digestible and workable tool. The tool tests are therefore initiated to discover the opinion and understanding of the product developers, not to make any generalizable claims and conclusions about the tool or effective behaviour change. Each test session will be recorded and evaluated. The evaluation will consist of a summary of positive features and critiques of each test concerning the tool. These will be combined and the most frequently appearing of those with a high importance will be included in the evaluation of the tool tests. The overall evaluation of the tool tests will be determined by evaluating the tests according to the pre-set requirements for the tool, which are stated in Chapter 5.2. That chapter also present an elaboration on the tool tests, a summary of the tests and the design suggestion for further tool development.

STEP 4 – EVALUATION

Aim of Step 4:

Discuss and conclude on the study, the process and the tool presented. Here the research questions will be answered and reflected upon, followed by final recommendations and an overall reflection.

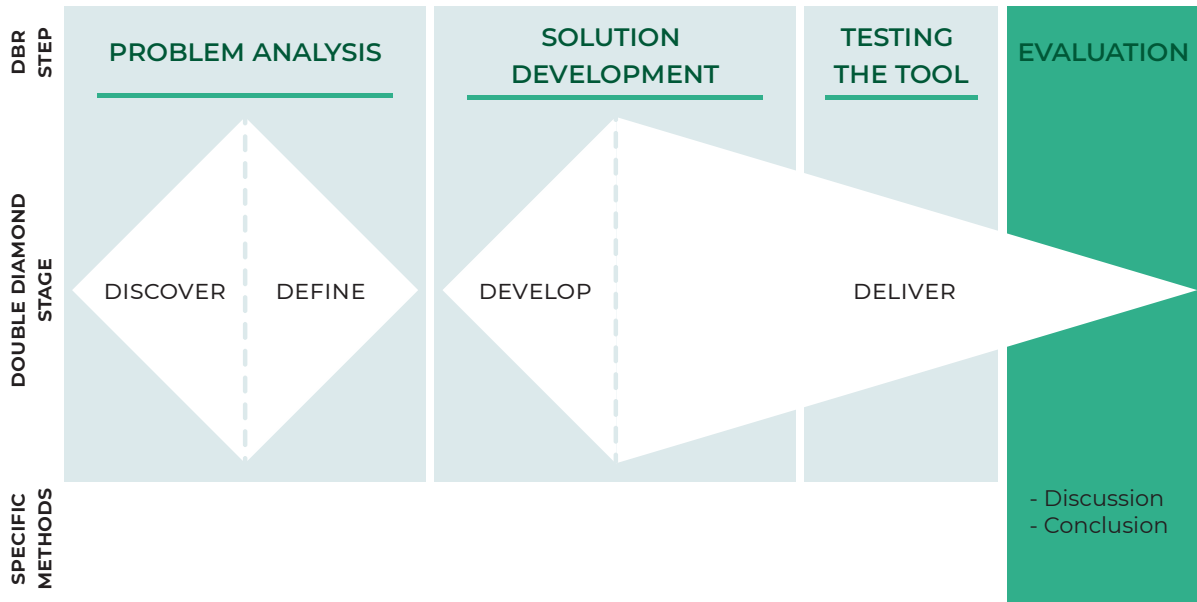


Figure 10 - Step 4 of the integrated DBR and Double Diamond approach

To finalize the converging Deliver stage of the Double Diamond (as shown in Figure 9), and to end the last Step of the DBR process the research questions will be addressed and a reflection is presented about how well the research problem is solved and what learning outcomes can be drawn from the process. These reflections can be translated into future design recommendations and principles, containing substantive and procedural knowledge with comprehensive and accurate portrayal of procedures, results and context, such that readers may determine which insights may be relevant to their own specific settings” (Herrington, McKenney, Reeves, & Olive, 2007, p. 8). With its evaluative characteristics, this step will include the discussion, conclusion, recommendations and reflection of my thesis and thereby bringing both approaches and the whole methodology to an end.

Reflecting on the methods used

Throughout the thesis the mentioned mixed methods will reappear in multiple ways, presenting more criteria, specific explanation of the procedures, or with their outcomes

to support part of the text. This chapter has presented the main methods, the main criteria or steps taken and the participant selection. Further details on questions, criteria and outcomes are presented in the Chapters and Appendices that have been stated. These elaborations were placed there because they are intended to improve the comprehensibility and flow of the thesis, and to show where the methods added to the study. Additionally, results and quotes from the interviews will appear throughout the thesis as support of my arguments. I intent to integrate the outcomes of these interviews and observations throughout the text to show the value of the iterative character this study. At the end of the thesis, in the discussion I will refer discuss the validity and reliability of each method explained in this chapter, and evaluate the decision to use the chosen methods.

3. Problem Analysis

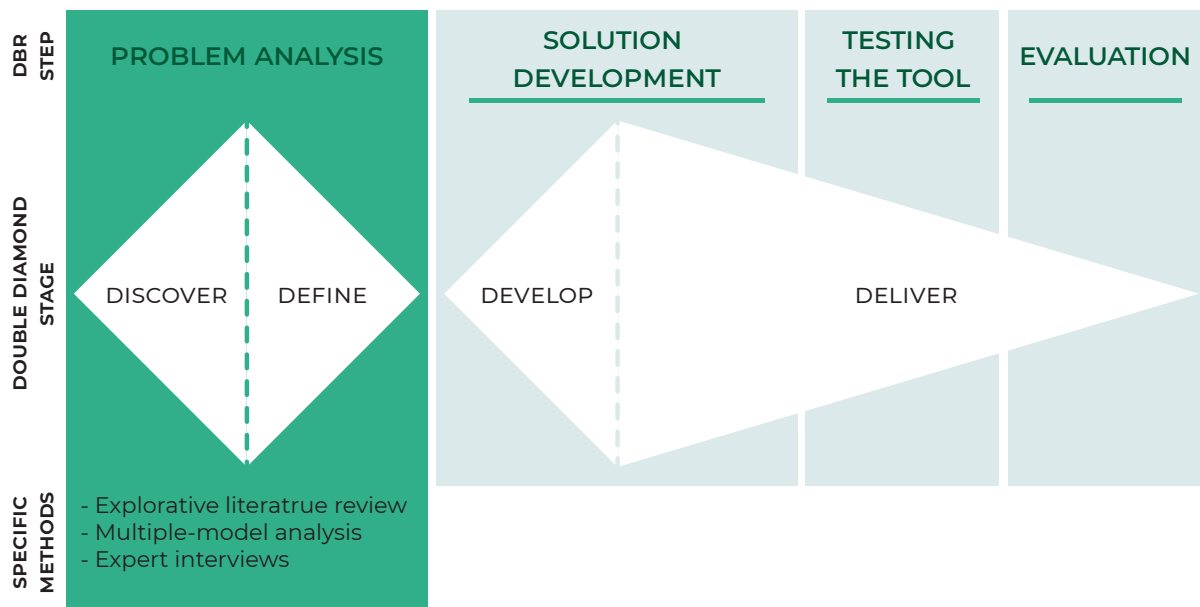


Figure 11 - Highlighting Step 1 of the research methodology

“By explicit use of theory, apart from experience, intuition and creativity, the designer is able to make a close fit between theory and practice”.

— van der Sanden & de Vries (2016, p. 138)

STEP 1: PROBLEM ANALYSIS

After introducing behaviour, this chapter continues to explore the in Chapter 1.1 defined research areas that will be integrated in this thesis; behaviour change principles, sustainable behaviour barriers, behaviour change mechanisms and message framing through design. In this chapter I explore as much as possible to expand my knowledge base to build a strong foundation to approach the problem statement. It is inevitable that I will bring personal beliefs and experience into the process (van der Sanden & de Vries, 2016), but I hope this chapter verifies my findings and decisions. This step will cover the relevant findings for my research, and where necessary Figure 6 of Appendix I can offer additional depth on the iterations, and Appendix VI on the multiple model analysis. For the theoretical framework, the explored research areas will be reduced to important elements necessary for the tool development in the next step.

HOW TO READ CHAPTER 3

In this chapter I will present the main elements and the determinants that will be part of the tool development; behaviour constructs, pro-environmental barriers, influence mechanism, and design tweaks. Throughout this thesis the terms ‘elements’ and ‘determinants’ will appear frequently. For example, an element would be *barriers* and a determinant of that element would be an example of that element such as *limited cognition*. Similarly, for the element *influence mechanism*, a determinant would be *reciprocity*. These terms will remain throughout the thesis. The chapters of this part will be divided into elements (apart from Chapter 3.1 which serves as background information), where I will discuss element per element:

3.2 Behaviour change constructs

3.3 Barriers to sustainable behaviour

3.4 Influence mechanisms

3.5 Message framing through design

Due to the iterative nature of my study, I will present a combination of the outcomes of the literature review and expert interviews. The goal is to explain how the final selection for each element came about due to this switching back and forth between literature. The summary of the elements and their determinants can be found at the Step 2 in Chapter 4.2.

3.1 LITERATURE ON HUMAN BEHAVIOUR

“The situation has provided a cue; this cue has given the expert access to information stored in memory, and the information provides the answer. Intuition is nothing more and nothing less than recognition.”

— Herbert Simon (Kahneman, 2011, p. 11)

ELEMENTS OF HUMAN BEHAVIOUR

A myriad of terms and concepts cross the scene when talking about what makes up the human mind from a psychological perspective. “Social influence can refer to such processes as conformity (creating or changing behaviour of belief to match the response of others), persuasion of attitude change (change in response to a message, discourse, or communication), compliance (change in response to an explicit request), yielding to social forces (change in response to the structure of the social situation), or helping (change in response to someone’s need)” (Pratkanis, 2007, p. 17). Many studies identify a variety of factors influencing (environmental) action (Barr et al., 2003) Behaviour is not static, and we are bounded by what our brain gives us access to. Figure 12 gives a general, but not absolute indication of some elements that make up our intention to behave. Constructs such as knowledge, ideas, thoughts, decisions, opinions, attitude, intentions are all said to make up who we are and what we do. How people get to these seems to be determined by determinants such as beliefs, values, norms, and personality.

(Druckman & Bolsen, 2011; Gifford, 2007, 2011). One must deliberate on possible outcomes of a certain belief or act and make a trade-off between the contingencies and probabilities of these outcomes to form an opinion (Tversky & Kahneman, 1981). Whatever is readily available in our minds is what we base our decisions on. The same process always occurs, even when an individual possesses very little information. In that case we make short-cuts, assumptions and emotional guesses (Druckman & Bolsen, 2011).

Since the end of the 1950’s, research on the effects of human psychology has steadily increased (Bonnes & Carrus, 2004), revealing that human behaviour change is much more complex than previously thought. As

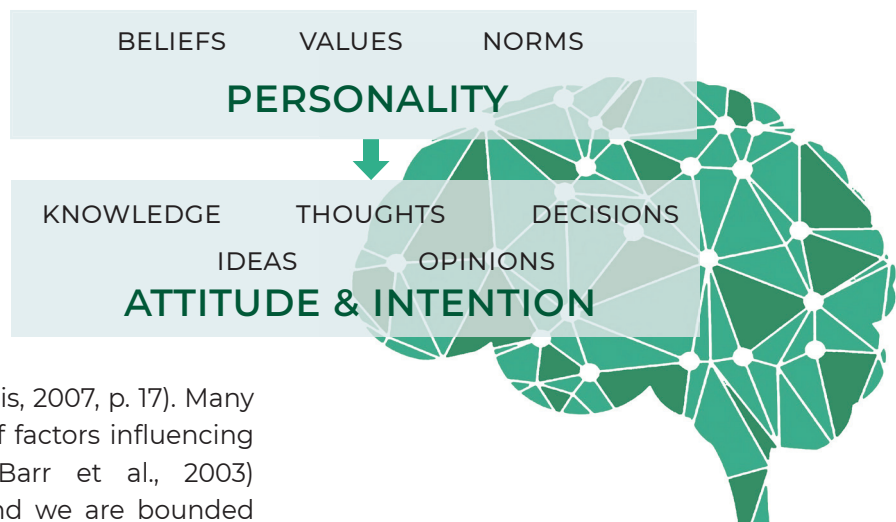


Figure 12 - Construction of mental element in behaviour

communication for persuasion began to grow, the most common approach was guided by the deficit model, necessity of merely filling the gap of scientific literacy (van der Sanden & de Vries, 2016). By filling the knowledge gap, the belief was that people would change their behaviour according to what they know. First comes

raising awareness, followed by promoting understanding through participation and the last step would be to motivate the change (Nerlich et al., 2010). One of the most frequently cited and referred to model describing the origins of conscious behaviour change was described by Ajzen in 1985 and is referred to as the theory of planned behaviour (Ajzen, 2011). Central in this model, as shown in Figure 13, is the combination of attitude, norms and behavioural control that affects an individual's intention to perform a behaviour.

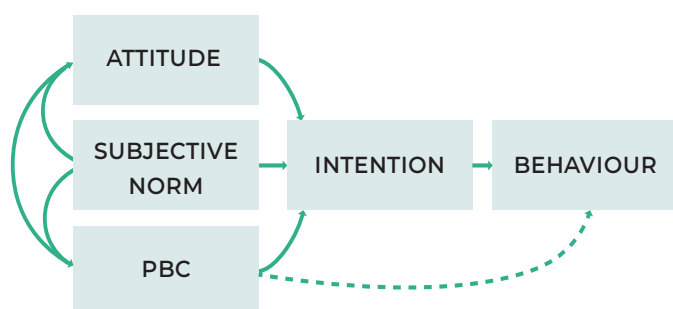


Figure 13 - Theory of Planned Behaviour by Ajzen

In a recent reflection on his own work, Ajzen discusses some of the main issue raised by critics: the model's assumption that we are rational decision makers, and that the model is so wide it could be applicable in all cases. The first issue raised affects the assumption that the model relies on the earlier described conscious brain. A conscious mind assumes rational and self-regulatory processing. However, the brain shows a constant expression of cognitive habits and routines formed by beliefs, understandings, culture, upbringing and training (Heimlich & Ardoin, 2008; Vercauteren, 2013). There is a plethora of research supporting the limits of the TPB and mentioning the importance unconscious of factors affecting behaviour change (Aarts, Verplanken, & Knippenberg, 1998; Chong & Druckman, 2007; Dijksterhuis, 2007; Kahneman, 2011; Kollmuss & Agyeman, 2002; Lakoff, 2010; Tversky & Kahneman, 1981). So there is more to behaviour than only rational decision making, especially when looking at complex problems such as pro-environmental behaviour.

PRO-ENVIRONMENTAL BEHAVIOUR

In recent years research on pro-environmental behaviour has given us more insights in the origins of this behaviour. If we increase knowledge on how to trigger pro-environmental behaviour, the facilitation for more bottom-up change can be put into place. However, pro-environmental behaviour is complex. According to Stern (2000) pro-environmental behaviours are mostly stimulated by norms and beliefs, personal commitment and positive utilitarian outcomes. However, he later points out that these intrinsic drivers are dependent on many contextual factors. Most researchers agree with his latter argument, claiming that pro-environmental behaviour is a combination of self-interest and social motives (Bamberg & Möser, 2007; Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). There is a constant need to fulfil a moral obligation, or a sense of pressure by a social norm (Gadenne, Sharma, Kerr, & Smith, 2011). According to Bamberg and Möser (2007) the decision to perform pro-environmental behaviour is dependent on a balance between the utilitarian outcomes compared to other choices (what's in it for me), the difficulty to perform the behaviour (how much effort does it cost me), and whether there are moral or social norms stimulating the pro-environmental option (what do others think of me). Social norms are defined by our peers, and includes not only how to behave, but also determine the level or concern for future generations, other species, and our ecosystem (Bamberg & Möser, 2007; Stern et al., 1999).

A difficulty in pro-environmental behaviour is that there is a discrepancy between the intent to behave in favour of the planet's well-being and the actual environmental impact (Stern, 2000). The main reason for this is misinterpretation of information, difficulty in recognizing fake news, or remembering wrong information. This seems unfair, because even if people have the right intent, their effects might not make a difference (Petty & Cacioppo, 1986). Amongst other reasons, this makes pro-environmental behaviour very complex and can be a cause of pro-environmental inaction. As stated in the introduction of this thesis, barriers

are a big cause of this inaction (Gifford, 2015; Kollmuss & Agyeman, 2002). What this means is that there mental and physical factors, even unconsciously, that people experience that causes them to refrain from changing their behaviour. With the increase in research on behaviour, and also in relation to sustainability, we've come to know more about these barriers. One of the researchers that has researched environmental psychology over the last couple of decades is psychologist Robert Gifford. Throughout this period, he has researched and collected which barriers inhibit climate change, adaptation of mitigation in the human mind. In recent years he has clustered his findings into a list of barriers he refers to as *dragons of inaction*. Examples are limited cognition, mistrust, social comparison and sunk costs. The full list is presented in Chapter 3.3 in Table 4. He argues that if these barriers can be overcome, we are steps closer to achieving a world pro-environmental behaviour is must more salient and the new status quo (Gifford, 2011). In this thesis I will elaborate on barriers that feed this discrepancy, hinder behaviour of stimulate behavioural inaction. But exploring what behaviour people experience is not as simple as just asking because of the way people their brain is wired. This can be partially explained by viewing mental process as two separate systems.

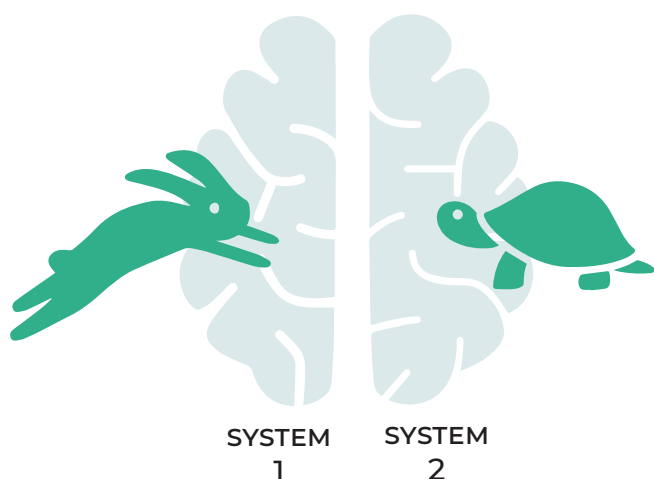


Figure 14 - Dual-System thinking by Kahneman

HEURISTIC AND COGNITIVE BIAS AFFECTING BEHAVIOUR

People experience behavioural barriers because of the way their brain is wired. More

recent research has shown that over 95% of our brain is steered by our unconsciousness (Dijksterhuis, 2007; Kahneman, 2011). In his research Kahneman (2011) refers to this as Dual-System thinking, where the fast thinking is called System 1 and the slower and conscious mind is System 2, as shown in Figure 14.

The System 2 makes deliberate decisions that are often complex and need careful consideration. However, most of people their brain is steered by their emotional, fast, and intuitive part of the mind; System 1. To do so, the unconscious mind makes constant short cut. These short cuts are referred to as heuristics. Heuristics are cognitive rules of thumb a brain uses to guide itself into decision making and problem solving (Altman, 2011; Brewer, 2001). The brain makes much more decisions than people consciously register. To cope with the excessive amount of information around, people rely on heuristics as a mental strategy to allow their brain capacity to be used for the necessary conscious thoughts. Heuristics are always based on what is readily available in the mind, making decision based on either former experiences or associations (Druckman & Bolsen, 2011; Pratkanis, 2007).

Heuristics are unmissable in daily life, but they are prone to errors. An example of a heuristic error is the what you see is what you get problem. The brain is not aware of the information it doesn't have. People can only actively process what the brain offers their mind. Kahneman (2016) gives an example showing this problem: "I tell you about a national leader and that she is intelligent and firm...now do you have an impression already whether she's a good leader or a bad leader? You certainly do. She's a good leader. But the third word that I was about to say is corrupt". The brain does not wait for the information it does not yet have, thus being prone to forming incomplete judgments.

What happened before does not necessarily happen again. The associations people make are not always what reality holds. Such errors are a form of what we call cognitive bias. A cognitive bias is a decision of judgment based on an error in people their systematic thinking. These errors

are based on the limited information availability and the brain's selective nature. Cognitive biases inhibit objective thinking and are a result of simplifying information processing. An often-occurring bias is our confirmation bias. "We pick out those bits of data that make us feel good because they confirm our prejudices. Thus, we may become prisoners of our assumptions" (Heshmat, 2015, para. 3)

The mindset people are in, be it conscious or not, depends on many factors. Figure 12 shows a small compilation of some elements that determine behaviour. Research sheds light on what it is that makes us change. This research consists of many models that have been developed which address behaviour change.

Through a multiple-model analysis (see Chapter 3.2) I will compare numerous behaviour change models to dissect the important constructs. In literature current models are based on the TPB (see Figure 13). Regardless of its limitations, the TPB still forms a strong base for the models that are available. However, through incorporating theories that include the acknowledgment of Dual-System thinking in the multiple-model analysis, I can dissect which constructs are relevant for both conscious and unconscious sustainable behaviour change. So by showing the reader two perspectives on behaviour change and how the brain behave I mark the starting point for the multiple model analysis. This starting points help me to identify from what perspective, or to what extend each perspective, occurs in the models. After this analysis, I will be able to determine from what perspective, or what combination I will address behaviour change in the tool that will be developed. These construct will form a basis for behaviour change and the opportunities for change within these constructs will be introduced in the Chapter 3.2.

3.2 BEHAVIOUR CHANGE CONSTRUCTS

SELECTING BEHAVIOUR CHANGE MODELS

To find relevant research on behaviour change, an exploratory literature review was conducted followed by a comparative multiple-model analysis. Keeping a wide scope follows the Double Diamond approach because it is necessary in the first stage to diverge and explore without converging. Although this thesis focuses on sustainable behaviour change, I've not limited my search here. Behaviour change can result in more sustainable behaviour due to multiple factors. It does not always mean that the change originated from a sustainable belief or intention. Therefore, I also include general behaviour change models.

METHOD AND SELECTION CRITERIA

As a starting point I refer to the review paper by de Kok et al (2015). In this article a taxonomy of behaviour change models is presented. The goal of this taxonomy is to present a set of behaviour change models that “distinguish the specific determinants that are targeted, practical, specific applications, and the theory-based methods they embody” (Kok et al., 2015, p. 297). Central in this review, is the applicability of the models, not for theoretical comparison but for practical implementation. Based on former reviews that did not specify on this distinction, the authors here included an additional criterion; effectiveness. About prior existing taxonomies not including effectiveness they states that “this means that although these taxonomies contain effective behaviour change methods (mechanisms), they also contain ineffective methods, and may even contain counter-effective methods. Thus, while well-suited for intervention coding, such taxonomies are not a good basis for intervention development” (Kok et al., 2015, p. 298). With such taxonomies, Kok et

al. mean the ones that do not focus on models with practical implications. Since my thesis aims at providing a design tool for product developers, this review paper, which includes only models with practical implications, is an excellent starting point for my model selection.

I have chosen additional criteria to narrow down the selection from Kok et al (2015) to find more relevant models outside the taxonomy. The criteria given by Kok et al included that: methods needed to be based on theory, they needed to include determinants that can in fact change, these determinants should also be able to predict change, and lastly the earlier mentions effectiveness parameters should be met. I've added two additional criteria specific to my research. First, the models needed to include a visual representation of the elements that lead to behaviour change. A visualisation of the links between the presented determinants of a specific model improves the comparison for my research because it decreases the chance of my bias interpretation of the causal effect of the explained determinants. Comparing visualisations of models makes it easier to select recurring elements and connections. Secondly, the models needed to include practical steps for implementation. Thus, taking the effectiveness criterion from the review paper to a next step and including only models that have elaborated their findings with usable practical ways to influence mechanisms in practice. I decided to include this criterion because these practical steps are what I am looking for to use in my tool. The analysis of the models ensures a complete collection and understanding on the implication of change mechanisms and practical steps for human behaviour change.

Table 1 - The multiple-model analysis on what each model is based on

	5A model of SRI decision (Pilaj)	Barriers for environmental action (Blake)	Elaboration likelihood model (Petty & Cacioppo)	Environmental Behaviour Framework (Gadenne)	Goal-setting theory (Locke & Latham)	Green consumerism (Groening)	Information-motivation-behaviour (Fisher)	Integrative model (Bamberg & Möser)	Mental capabilities (WWR)	Model of pro-environmental behaviour (Kollmuss & Agyeman)	Persuasion (Cialdini)	Predictors of environmental behaviour (Hines et al)	Self-Determination theory (Ryan & Deci)	Organismic integration theory (Ryan & Deci)	Transtheoretical stages of change (Prochaska & DiClemente)	Value-Belief-Norm Theory of Environmentalism (Stern)	Total
General behaviour model	X		X			X	X	X	X	X			X		X		9
Environmental behaviour		X		X		X				X		X				X	6
Decision-making			X		X	X		X	X		X			X	X		8
Barriers identification		X	X							X							3
Practical steps	X				X						X						3
Rational approach (TPB)	X	X		X	X	X	X			X		X	X		X		10
Affective approach (Dual-system)			X					X	X		X		X	X		X	7

Table 2 - The multiple-model analysis showing constructs the models contain

	5A model of SRI decision (Pilaj)	Barriers for environmental action (Blake)	Elaboration likelihood model (Petty & Cacioppo)	Environmental Behaviour Framework (Gadenne)	Goal-setting theory (Locke & Latham)	Green consumerism (Groening)	Information-motivation-behaviour (Fisher)	Integrative model (Bamberg & Möser)	Mental capabilities (WWR)	Model of pro-environmental behaviour (Kollmuss & Agyeman)	Persuasion (Cialdini)	Predictors of environmental behaviour (Hines et al)	Self-Determination theory (Ryan & Deci)	Organismic integration theory (Ryan & Deci)	Transtheoretical stages of change (Prochaska & DiClemente)	Value-Belief-Norm Theory of Environmentalism (Stern)	Total
Context	X	X		X		X				X	X	X	X	X		X	10
Knowledge						X	X			X		X			X		5
Attitudes (e.g. emotions, beliefs)	X		X	X		X		X	X			X	X				8
Social norms (e.g. others, peer behaviour)		X	X	X	X	X	X			X	X			X		X	10
Efficacy (e.g. capabilities, motivation, skills)		X			X	X	X	X	X				X	X	X		10
Unconscious steering (System 1 thinking)			X	X					X		X						4

ANALYSIS OF THE SELECTED BEHAVIOUR CHANGE MODELS

In total 16 models were analysed. They ranged from general behaviour analysis models, to activating behaviour change models, to specified environmental persuasion models. Table 1 shows under what type of model each can be placed. Rows 1-5 were determined by the explanation given about each tool by the author and clustered under one or more of these five types of models. I've discussed two perspectives on behaviour change, the TPB and the Dual System thinking. To base my multiple-model analysis on existing theory I analyse the constructs mentioned that closely relate to these perspectives. As is visible in Table 2, the rows are divided into the main constructs. When a term was explicitly mentioned in a model (in between brackets terms were also accepted as that constructs) it received an 'X'. To discover how often the models include System 1 thinking perspectives, I've added the last row. Through this analysis, I get a better view on to what extent the newer Dual System approach is retrievable in the selected models. I only use a combination of current models to refrain from making decisions based on my personal beliefs and to avoid researchers bias. Therefore, although Kahneman's Dual Systems thinking is widely accepted, if it is not apparent enough in the analysis I will not use it directly in the tool development. Table 2 shows the outcomes of the analysis. The full analysis can be found in Appendix VI.

Table 1 shows that the analysis contains a wide scope of types of models, therefore, allowing different perspectives to be brought together in my analysis. Although a variety of models touch upon the irrational nature of human behaviour¹,

¹ Barriers for environmental action (Blake), Elaboration likelihood model (Petty & Cacioppo), Environmental behaviour framework (Gadenne), Integrative model (Bamberg & Möser), Mental capabilities (WWR), Model of pro-environmental behaviour (Kollmuss & Agyeman), Persuasion (Cialdini), Self-determination Theory (Ryan & Deci), Orgasmic Integration Theory (Ryan & Deci), Value-belief-norm theory of environmentalism (Stern)

traces of the TPB are still more salient in many models. Within the models there is little information on barriers and practical steps, suggesting extra research is needed to add to the literature review.

THE THREE BEHAVIOUR CHANGE CONSTRUCTS

As the multiple-model analysis shows in table 1 and 2, there are six main constructs that have been selected from the analysis in discovering which constructs were mentioned most for each model. The analysis was performed by asking multiple questions:

1. What is the main idea of the model?
2. Which key elements are described in the model explanation?
3. And more specifically, which elements make up the visual representation of the model?
4. Which key constructs are mentioned as the biggest drivers for change?
5. Is the model aimed at cognitive (conscious) mental processes or emotional (unconscious) mental processes?
6. Are there recurring constructs throughout several (or most) models? Can they be clustered according to the chosen behaviour perspectives (TPB and Dual System thinking)?
7. What practical steps are mentioned to support the change constructs? (Results here were mainly for finding the behaviour mechanisms discussed in Chapter 3.4)

To answer the question, each visualization of the model was analysed and the terms used were compared to see the overlap between the models. Where possible, the main article written by the original researcher of the model was analysed to obtain the original explanation of each model. In reading the articles, the main ideas, and occurring constructs were highlighted and noted down. After analysing each model these constructs were analysed again and clustered under 6 main constructs that occurred the most and agree with the two perspectives discussed earlier.

As an example, the Information-Motivation-Behaviour model by Fisher refers to three main constructs in the visual model: information, motivation, behavioural skills that lead to behaviour. Information is related to knowledge and thus an 'X' is given, motivation was explained in the text as a driver because of the perception of sufficient ability by the consumer so an 'X' was given here as well. Lastly, behavioural skills also referred to efficacy so the 'X' remained. Context is not mentioned in the visual representations, and not deliberately mentioned in the article so does not receive an 'X'. Because the model does not talk about the influence of personality and irrational behaviour, attitude and unconscious steering also remain empty.

During step 4-6 the main constructs were written down from each models. Whenever models talked about extrinsic factors, outside influencers, outside effects, I've clustered them as context. The elements that were considered elements that can't be easily changed for one person, but are more at regime or landscape level fall under this construct.

Recurring terms for attitude were beliefs, norms, opinions, personality, ideas, decisions and values. I clustered these terms under attitude if they were mentioned as elements influencing behaviour as explained in Chapter 3.1. Mentions of social norms, peer pressure, social influence, pressure and personal support were all considered as part of social norms.

Throughout the multiple-model analysis, there was little mentioning of Kahneman's Dual System thinking. A reason for this was that most models were either older or based on the TPB. So there are many suggestions for Kahneman's vision apparent, but, as is visible in Table 2, not many deliberate mentions. Since I want to refrain from including my personal input, I've avoided relying too much on my interpretation. So as unconscious behaviour is not mentioned frequently, although in many model hint are given to its existence, I do refer to it strongly. From an analysis perspective this could pose a limitation in the tool development for not considering Kahneman's theory sufficiently.

However, as will show in Chapter 3.2, I've selected unconscious influence mechanisms to address the barriers and constructs to still take account of the Dual System thinking perspective, as well as following the TPB perspective.

As shown in Table 2, the resulting constructs were context, knowledge, attitudes, social norms, efficacy, and unconscious thinking. However, as has hopefully become apparent during this review: information provision is not key. A certain level of knowledge is required, but primarily to ensure basic comprehension. As a main construct, knowledge only appears in five models, but knowledge is also described as a part of attitude. I've therefore decided to include knowledge as a part of the attitude construct and disregard it as an individual one.

Another construct outside the scope of my research is context. The external factors are hugely important in human behaviour. Behaviour can never be measured in isolation, because it is those external factors that influence our norms, beliefs, emotions and situational factors which determine how we behave (Cachelin & Ruddell, 2013; de Vries, 2017; Heimlich & Ardoin, 2008). However, in changing individual behaviour in this thesis I can only address the individual itself. Changing the environment of the potential consumer would require different steps and a different tool which are not part of the aim of this study. I, therefore, consider context as a construct to be outside the scope of my research.

The last construct that I leave outside the scope is the unconscious steering construct. As the results shows, throughout the articles this construct did not get sufficient specific attention when compared to the other constructs. I've therefore decided not to take unconscious steering as a direct construct, but let the unconscious elements of behaviour appear in the influence mechanisms.

This leaves three important constructs that I consider part of human behaviour; attitude, social norms and efficacy.

ATTITUDE

“Attitudes develop as a result of cumulative experience and knowledge derived from past exposure to environmental stimulus” (Udalov, Perret, & Vasseur, 2017, p. 483). Experience and knowledge is driven by many determinants. I will mention two intrinsic determinants that appear consistently throughout literature: beliefs, and emotions. A belief is something that is accepted or held as a truth and is therefore held as an opinion (Merriam-Webster, n.d.). We must be aware of people their bounded rationality; a state where humans act upon the most readily available way in which information is provided because of their limits to cope complex and information abundant environments (Simon, 1989; Tversky & Kahneman, 1981). Therefore, when a belief is confirmed it enforces the opinion and strengthens the attitude making it inflexible and dogmatic (Chong & Druckman, 2007). So, these dogmatic attitudes are built up from beliefs and emotions. Emotions are cognitive and moral guides to opinion formation by filling up knowledge deficiency gaps by connecting to accessible mental values and norms (Frijda & Sundararajan, 2007; Roeser, 2010; Sleenhoff, 2016). Without realizing, emotion plays a key role in evaluating information. They are inseparable from thought, without emotion dislike and like have no meaning (Lakoff, 2010), making information comprehensible and categorisable in uncertainty of information abundance (Sleenhoff, 2016). We let belief and emotions determine out attitudes. These attitudes allow our skills to grow and habits to form, which then ultimately lead to our behaviours. The re is not one factual link between the terms, so therefore I keep the explanation rather shallow and only aim to give an indication of how attitudes are formed.

SOCIAL NORMS

People act according to their set of familiar norms, but these norms are constantly affected by social influences. Focusing on the strength of social influence can be effective in changing how a message is perceived. People tend to believe what peers say regardless of the content of the message. Schwartz (1977) explained norms as strong feelings of a moral obligation or expectations that people experience. These

norms are anchored in the self but originate in social interaction. These norms create the terms of socially accepted behaviour, and can therefore have altruistic outcomes such as pro-environmental behaviour (Bamberg & Möser, 2007). People are herd animals and chances of survival are bigger when living in groups, so behaving similar to peers is crucial for acceptance and survival. Simultaneously, the human brain is prone to act along the path of least resistance, because that requires minimal cognitive energy (Kahneman, 2011). Therefore, instead of making all decisions individually, the brain feels comfortable to rely on opinions on people they trust and feel associated with (Cialdini & Goldstein, 2002). Although, when questioned, many people will argue they want to feel autonomous in their decisions and behaviour, social influence is often much stronger than realised (Pratkanis, 2007).

EFFICACY

The last construct is centred around actual and perceived capability. Actual control is a matter of physical or practical facilitation, but perceived control focuses on the extent to which a person believes they have control over their action or the extent to which their action will be effective. A high level of perceived control or efficacy of action will lead to a more positive intention (Ajzen, 2002). As the name says, it is the perception that influences the drive, so designing for increase of actual and perceived control increase efficacy feelings that can change behaviour. We think we make most of our choices, but when it comes down to it, we are very likely to follow that what is presented to us as the best way (Kahneman, 2016). Sometimes people also perform behaviour because they don't know how to change or feel unable to change. So, when creating an environment where choices are limited or certain behaviours are stimulated can affect the feeling of control and efficacy somebody has. People like to be reassured of their being and doing. By having the feeling that they are constantly achieving things, they feel like what they do is effective and appreciated. This confirmation then increases their efficacy, resulting in a positive loop that increases their intentions to change.

3.3 BARRIERS TO SUSTAINABLE BEHAVIOUR

FOCUSSING ON BEHAVIOUR BARRIERS

Sustainable behaviour is complex. It is influenced by demographic factors, numerous external factors and intrinsic behaviour constructs (Kollmuss & Agyeman, 2002). Where earlier models on pro-environmental behaviour were based on a deficit model, later research showed that in most cases increasing knowledge did not lead to more pro-environmental behaviour. This is linked to the value-action gap (Blake, 1999). Gifford's (2011) dragons of inaction play an important role in pro-environmental behaviour. Research on energy conservation shows inaction comes from barriers preventing actual performance. A problem in sustainable development is that it is a distant problem where consequences are not directly felt leaving people uncertain on how to act. The challenge is to bring the problem to life and aim to find ways to overcome the barriers stimulating the value-action gap (Swim, Fielding, & Hornsey, 2014). For each possible change in behaviour there is a barrier holding a person back. "It is the restraint, the resistance, the avoidance forces in the motivational system that inhibit change and make persuasion necessary" (Pratkanis, 2007, p. 84). So, my research is focused on the barriers rather than the facilitators of pro-environmental behaviour change, with Gifford's barriers as central focal point. When designing to overcome the barriers, the interventions will automatically facilitate environmental behaviour change (Pilaj, 2017; Stern, 2000; Swim et al., 2014).

BARRIERS FOR ENVIRONMENTAL BEHAVIOUR CHANGE

The three constructs are fundamental for behaviour change, but by themselves can

also be barriers or opportunities. If a person's attitude is pro-environmental, that person might want to change. However, if the person has a negative attitude towards change, the attitude construct becomes a barrier. If there is sufficient social pressure a person might comply, but the other way around the person might refrain because of the social norm. And if the efficacy is high, it creates opportunities, whilst it's a barrier if the efficacy is low. However, because I use the constructs as pillars on which behaviour can be constructed (hence the name), I use the constructs in their neutral sense, where I do not give them a direction of a weight. They are simply the categories under which the other elements in the tool are divided. Whether a construct becomes a barrier, I leave to the specific barriers, which in that sense become zoomed in elements that fall underneath these constructs. So the constructs are the pillars of behaviour change, and the barriers determine the strength of these pillars and the factors that create opportunities for change or inhibit change are the influence mechanisms. I will connect the constructs and barriers together to show their relationship. To do so, I will refer to expert opinions for validation, and seek for additional literature on how the barriers connect to the constructs.

To determine which barriers to include in this research I've set several criteria. First, to avoid too much noise in the elements of the research, I've decided to narrow down the barriers to one set of identified barriers. This set of barriers had to be based on a lengthy collection of data, but had to be recently published (after 2000), and from a credible source. The barriers all had to

be focused on sustainable behaviour barriers. Fitting all the criteria, I decided to focus on the dragons on inaction by psychologist Robert Gifford as foundation for the barriers in this research (shown in table 4 in column 1 and 2).

THE DRAGONS OF INACTION

Robert Gifford has done many years of research on the reasons behind environmental inaction. Over several decades he has gathered many insights in on behaviour change and categorized them into so called dragons. These dragons stand for general psychological obstacles that block behaviour change (Gifford, 2007). With his framework of dragons on inaction, Gifford tried to offer a comprehensible list of manifestations, in total 29 of them¹, that fall under one of seven formulated barriers of inaction, see Table 4. The left two columns of the table shows the dragons of inaction as determined by Gifford (2011). The other two columns show the mentions of the barriers by the experts and additional literature.

NARROWING DOWN THE BARRIERS

Processing all the by Gifford described barriers at the same time is a difficult task. In conversation with all experts, narrowing down the selection of barriers to a more manageable amount seemed necessary to decrease complexity. As Gifford arranged his barriers into seven main categories, it seems difficult to narrow down his barriers even more. To narrow down the barriers I refer to the expert interviews, as described in Chapter 2.1 on the research methods. During the interviews with these experts I've asked them to name the most frequently occurring barriers for sustainable behaviour change. Most experts (Gagestein, 2018, personal interview; Mes, 2018, personal interview; Slob, 2018, personal interview; Visser, 2018, personal interview; Handgraaf, 2018, personal interview; Hoekstra, 2018, personal interview) mentioned up to 8

¹ In other articles Gifford refers to 33 dragons of inaction adding *confirmation bias*, *time is money*, and *perceived inability* to the list. For scoping purposes I decide to focus on the 29 presented in his article (2011)

barriers, suggesting that if I limit the number of barriers to fewer it would reduce the accuracy too much. They also agreed not to include more barriers, agreeing with literature stating that people find it hard to process more than 7 +/- 2 items at the same time (Weinschenk, 2011; 2016; Jones, 2002).

I therefore, decided to stick to nine barriers. Having Gifford's barriers as starting point, narrowing down the selection has been done by referring to experts and asking for a validation of which barrier occur most in practice. Afterwards, I've gone back to one other research that studies environmental behaviour barriers to validate this selection. This study, performed by Lorenzoni et al. (2007) is a compilation of multiple other studies, and summarized their finding. Therefore, I only use this review as additional theoretical iteration, and do not attempt to reproduce the same with less accuracy. The Table 4 shows the mentions that made the selection of the nine barriers. The left two columns show the barriers as determined by Gifford (2011). The third column shows how many expert mentioned the specific barrier. For a more specified analysis on each individual expert, refer to Appendix VII. The fourth column shows confirmation by specific literature and the last column shows the total mentions.

From the table I've selected the barriers that have been mentioned at least 5 times in total. These selected barriers formed the basis for the selection of barriers that are taken to the design step of this study. I decided to select nine barriers in total. Since the table shows there are not more than nine barriers that have five or more mentioning I have decided to take all the barriers to the next step. Table 5 below shows the selected barriers for the tool development. As a result, not all the barrier categories of Gifford's work are included. However, as the analysis showed, some barriers seem less important than others. To not disregard the left-out barrier groups, I will shortly describe why I they are not considered for the next step. First of all, the ideologies group is not included. Ideologies are concentrated around the way people perceive the world, their fundamental ideas on the

Table 4 - The dragons of inaction by Gifford (2011) and the mentions by experts and additional literature.

Behaviour category (Gifford, 2011)	Specific barrier (Gifford, 2011)	Behavioural barriers (Behaviour experts)	Additional literature (Lorenzoni et al., 2007)	Total
Limited Cognition	Ancient brain	XXXXX		5
	Ignorance	XXXXX	X	6
	Environmental numbness	X		1
	Uncertainty	XXXXX	X	6
	Judgmental discounting	XXX		3
	Optimism bias			0
	Perceived behavioural control	XXXX	X	5
Ideologies	Worldviews	X		1
	Suprahuman powers	X	X	2
	Techno salvation			0
	System justification	XXX	X	4
Comparison with others	Social comparison	XXXX	X	5
	Social norms and networks	XXXX	X	5
	Perceived inequity	X	X	2
	Sunk costs	X		2
	Financial investments	XX		2
	Behavioural momentum			0
	Conflicting values (utilitarian outcomes)	XXX	X	4
Discredence	Mistrust	XXXXX	X	6
	Perceived performance inadequacy	XX		2
	Denial	XX		2
	Reactance	XXX		3
Perceived risks	Functional	XXXX	X	5
	Physical	X	X	2
	Financial	X		1
	Social	X		1
	Psychological	X		1
Limited cognition	Temporal	XXXX	X	5
	Tokenism	X		1
	Rebound effect	X		1

well-being and future of our planet, but also on justifying the status quo. These beliefs are embodied in people their attitudes, and lie so deep they are hard to change. I do not aim to develop a tool that can alter one's beliefs, which is too difficult. So therefore I do not include the ideologies directly in the tool. The second group are the sunk cost. These refer mainly to the prior investments that have already been made, financial and non-financial. Since product developers have little influence on prior purchases, and are selling new (innovative) products, this barrier can't be overcome through simple message design. And as I will explain later, I do not wish to focus on the financial aspect of pro-environmental behaviour, so therefore do not include the financial aspect of sunk cost in the tool development. Other sunk costs will be embedded in other barriers. Lastly, there is the limited behaviour group. Limited behaviour focuses on tokenism and the rebound effect, which are both mostly external factors on habits. This research focuses on decisions of individual consumers. Therefore, contextual factors and existing habits causing the limited behaviour barriers are outside of my research scope and will not be included either. Table 5 shows the selected barriers for the tool development.

Table 5 - Selection of barriers used for the tool development step of the process

Gifford's barrier category	Specific barrier
Limited cognition	Ancient brain
	Ignorance
	Uncertainty
	Perceived behavioural control
Comparison with others	Social comparison
	Social norms and networks
Discredence Perceived risks	Mistrust
	Functional
	Temporal

THE SELECTED BARRIERS

The elaborate explanation of the barriers chosen for the tool and their coupling to the construct can be found in Chapter 4.4. During the Step 2 of the process the barriers are changed through iterations between theory, experts, product developers, designers and a peer group session to find the right balance for the tool. The final barriers are therefore elaborated upon there. Below a short description of each individual barrier taken to the next stage, based on Giffords' (2015) explanation of the dragons.

Ancient brain: Due to the little evolved brain people have a tendency to think short term making it difficult to act in benefit of the long term future.

Ignorance: People don't know about the problem, don't know what to do, or are being told the wrong information.

Uncertainty: If people don't feel secure in their knowledge, the outcome, or what others tell them to do they rather act in self-interest and refrain from changing.

Perceived behavioural control: People don't act because they think their behaviour has little or no effect.

Social comparison: People consistently compare themselves to others and follow people they admire, even if the behaviour is wrong.

Social norms and networks: Norms set by people their surroundings determine how they behave, even if the behaviour is wrong.

Mistrust: If there is no trust between two parties resistance to act will be the result.

Functional: If people don't feel the product or behaviour will do as it promised they will not buy or comply.

Temporal: If the problem is too far in the future or people feel the time needed to invest is too long for the outcome they refrain from acting.

3.4 INFLUENCE MECHANISMS

INFLUENCE MECHANISMS THAT CAN CHANGE BEHAVIOUR

The three constructs that determine behaviour identified in the multiple-tool analysis are attitude, social norms and efficacy. However, these constructs do not provide enough information to know how to influence the barriers connected to the constructs. I will use both literature and expert knowledge to find what is known about ways to change behaviour. I will refer to these ways as influence mechanisms. An influence mechanism is a building block of how to affect certain behavioural human determinant. Or as defined by Pratkanis (2007, p. 17) it is:

“Any non-coercive technique, device, procedure, or manipulation capable of creating or changing the belief or behaviour of a target of the influence attempt”

In doing so, numerous influence mechanisms are identified, that can later be linked to each of the three change constructs and the barriers.

INFLUENCE MECHANISMS LITERATURE

To limit myself to the number of sources addressed within the research for influence mechanisms I've decided to narrow down my input to several sources, both in theory and practice. The theoretical input for the influence mechanisms will consist out of articles that accompany the models in the multiple-model analysis. Throughout the analysis I've not only looked for behavioural constructs, but also for influence mechanisms that accompanied those constructs. These can all be found in the multiple-model analysis in Appendix VII. However, since the Double Diamond Discover

stage aims to explore more than what is readily available, I've expanded the search to find more influence mechanisms, or verify those already selected. In his work, social psychologist Anthony Pratkanis (2007), captures a plethora of work on social science and provides a summary of tactics applicable to social influence. I've included influence mechanisms described in his index of tactics as his work is often referred to in social sciences and was mentioned multiple times by the experts during their interviews¹.

In his book Pratkanis (2007) describes four criteria to an influence way that I've also used throughout the selection of applicable influence mechanisms. First, the mechanism needs to contribute to improving the contextual and psychological state the consumer is in the moment of receiving the message (mainly aimed at functional and cognitive barriers). Secondly, the mechanism should improve the relationship with the consumer (aiming at overcoming mistrust and social influence). Thirdly, the mechanism should have potential to be influential (in case of the tool development through design tweaks), and lastly it is beneficial if it addresses the emotional mind (aiming at the unconscious mental system).

The tool will be aimed at helping product developers with their message framing design, so I also want to include other sources that take a more market aimed approach, however, still being written from a psychological perspective. I looked for practical influence mechanisms with clear real-life examples that could be applied in the tool development. For this I

¹ The book was mentioned by experts: S. Melchior, S. Gagstein, G. Slob, and A. Visser

choose several additional sources: The six persuasion techniques by Robert Cialdini (2002), 'Dit is aandacht'² by Stefan van der Stigchel (2016), 'Ontwerpen voor gedragsverandering'³ by Reint Jan Renes and Sander Hermesen (2014), and 'Nudge' by Richard Thaler and Cass Sunstein (2008). These books have a background in social psychology, but are written with practical implementation purposes for the reader. The authors aim to make a first translation from theory to practice, adding to my methodology.

THE SELECTED INFLUENCE MECHANISMS

Iterations prevent me from relying only on research from literature. I refer to the expert interviews for their knowledge and experience on influence mechanisms for (sustainable) behaviour change. The mechanisms are organized according to the behaviour construct they belong to and will be selected and linked to the barriers in the next step of the research process. In the Table 6 a summary is presented of the selected influence mechanisms. For an elaborate explanation of each influence mechanism see Chapter 4.5 or Appendix VIII.

Table 6 - Selection of influence mechanisms per construct used for the tool development step of the process

Attitude	Social Norm	Efficacy
Emotional steering	Public commitment	Autonomy
Attention points	Social norms	Goal-setting
Storytelling	Reciprocity	Guarantees
Scarcity	Trust	Empowerment
Self-interest	Role-model or authority	Feedback
Guilt and responsibility	Personal contact	Practical facilitation
	Social ranking	Choice architecture

Emotional steering: Focus on emotions and surprise elements to enthuse people.

Attention points: Place the focus on the beginning, middle, or end.

² Translation: 'This is attention'

³ Translation: 'Designing for behaviour change'

Storytelling: Set the mood using empathy and anecdotes.

Scarcity: Focus on people's desire to keep what they already have.

Self-interest: Engage by connecting to people their personal believes.

Guilt and responsibility: Focus on people their obligation to do the right thing.

Public commitment: Speak to people's desire to belong to a group and keep earlier promises.

Social norms: Focus on the norm created by a person's surrounding peers.

Reciprocity: By making a nice gesture, people feel inclined to return the favour.

Trust: Be transparent, shows weaknesses and focus on shared goals.

Role-model or authority: Show desired behaviour to set a new norm on how to behave.

Personal contact: Focus on face-to-face contact with peers to bring across the message.

Social ranking: Focus on status, and rank people's behaviour compared to their peers.

Autonomy: Give people an initial boost.

Goal-setting: Set interim goals or alerts.

Guarantees: Offer opportunities to try new behaviour through refunds or testing.

Empowerment: Highlight people's skills.

Feedback: Give information on progress.

Practical facilitation: Create a path of least resistance for people to follow.

Choice architecture: Change the default or pre-set the decision criteria.

3.5 MESSAGE FRAMING THROUGH DESIGN

DESIGNING THE MESSAGE

In the previous sub-chapters, I've discussed elements important to behaviour change, and for each element selected their most important determinants (constructs, barriers and influence mechanisms). Since the goal of this thesis is to present a workable tool for product developers that offers them new insights in practicalising these determinants, it is necessary for product developers to be able to link these determinants to their message design. The influence mechanisms explain how to change people their behaviour, but do not explain how to apply this in visual design. For that, more literature on designing through framing is required, which brings us to the last element of the tool: design tweaks. Therefore, this sub-chapter elaborates upon what design tweaks can be applied to implement influence mechanisms to content output and how to frame consumer messages to increase the chance of achieving the desired consumer behaviour change.

In this sub-chapter I will explore literature to discover theory available on message framing for behaviour change from a consumer experience design perspective. In previous chapters I've discussed literature on constructs of people's behaviour, barriers to sustainable behaviour change, and mechanisms to influence that behaviour. Desmet & Hekkert (2007, p. 8) "believe that social sciences, and in particular psychology, offer clear bases for experimental concepts that can structure some of the discussion in the design domain.." and hope that by combining these knowledge fields the quality of consumer experience improves.

INTRODUCING FRAMING

Humans behave predictively irrational, which makes it difficult to predict and analyse their

behaviour (Kahneman, 2011). However, it also makes them even more susceptible for change in both opinion and intention to change. This possibility to influence the human mind is used in many marketing methods. Who bring a message, the way the message is presented or the tone of voice in which it is told are some examples of the ways to affect reactance to a message. The way in which we tell a message is called framing. Frames are contexts in which messages are placed. These frames enable individuals to categorize the information and form an opinion about the message (Benford & Snow, 2000; Chong & Druckman, 2007; Thaler & Sunstein, 2008). In framing, certain elements are selected or highlighted to increase the salience of part of a message (Entman, 1993).

Especially in environmental communication, framing can help bring order in people their brain to understand environmental issues (Lakoff, 2010). A criticism against framing is that it can unconsciously deceive the receiver by not presenting nuanced information of an issue (Van Gorp & van der Goot, 2012). However, since many researchers say frames are most successful when there are built upon existing values, there must have been prior exposure to a part of the framing message before one's opinion is affected. Framing is only effective when a consideration about a message is already stored in memory and is accessible for use (Chong & Druckman, 2007). In that sense frames can still present false information, but they are not fully responsible because they built upon an already present consideration in the receivers' brain caused by previous experiences.

So, framing involves the communication of selected elements of reality and making them more salient to promote a concept. A frame

can then determine how a large portion of the receivers understanding and act upon an issue (Entman, 1993). Frames can “affect the attitudes and behaviours” (Chong & Druckman, 2007) by “simplifying and condensing” (Benford & Snow, 2000) specific information to “define an issue” (van de Velde, Verbeke, Popp, & van Huylenbroeck, 2010) and affect “how people think and how people articulate ideas” (Cachelin & Ruddell, 2013) about those issues.

Message framing through design

As explained there is no one-size-fits-all, using framing tactics does not show linear results in real-life, nor can we really know if that specific frame caused a change in behaviour. In practice frames never operate in isolation, which conflicts with what happens in research where it is tested without comparison (Cachelin & Ruddell, 2013; de Vries, 2017). By isolating the effect, the influence of extrinsic influences and social context are ignored (Druckman, 2001). This can result in unrealistic outcomes or a less strong effect in reality (Cobb, 2005). However, this does not mean that it should not be given an attempt. “Recent research has shown that an effective persuasive message is one that focuses the target’s attention and cognitive activity on exactly what the communicator wants them to think about” (Pratkanis, 2007, p. 40). By using what is currently available and bringing together the content from the elements with ways to visually design a message could help gain more insights in the effects of the message framing through design for more sustainable behaviour. With a message I mean any form of multimedia, tangible or non-tangible external information provision towards consumers. This may be using components addressing all senses, using all types of media, in all kinds of formats. Message framing is therefore the way in which this message is developed and designed to influence the consumer’s experience. A product developer therefore has a double agenda: it is essential that the relevant information is transferred to the consumer, but maintaining the consumer’s attention is equally important (van der Stigchel, 2016). Being able to apply design tweaks can offer guidance in achieving both.

SELECTING DESIGN TWEAKS

In the interaction with a product or message people use their senses, knowledge and emotions to use and evaluate a product. The specific knowledge or interaction is specific to the message, but the processes that occur in the brain regarding these messages is similar each time (Hekkert & Schifferstein, 2008). This suggests that there are somewhat generalizable tweaks addressing consumer experience. In this experience there are three components to message design: cognitive meaning (semantics), visual arousal (aesthetics), and emotional response (Desmet & Hekkert, 2007).

Within these components there are numerous examples of design tweaks that can be applied in message framing design. The full list of design tweaks can be found in Appendix IX., but here are some examples. People first look at the top left of a page, so *placing the important text* there assures people to read that message first (Middendorf, 2012). Simultaneously, *blank space around an image* attracts focus to the image (Middendorf, 2012; Weinschenk, 2011), and *symmetry* increases believability (Weinschenk, 2016). In situations where an action is required, *place the next step close to the current step* (Weinschenk, 2011) and always *focus on the next click* through for example *arrows of lines* guiding to consumer (Middendorf, 2012; van der Stigchel, 2016, Weinschenk, 2016). But also in imagery tweaks can be applied. For example, placing a photo of another person showing happy *micro-expressions* will trigger the same emotion in the consumer (Hermsen & Renes, 2014; Weinschenk, 2011, 2016), or using *highlights* to guide the consumer into the right decision or direction (Hermsen & Renes, 2014; Middendorf, 2012; Weinschenk, 2011; van der Stigchel, 2014).

The first criterion to the search for design tweaks was therefore that each tweak must comply to one or more of these components. The second criterion was that the tweaks must be grounded by research, either from empirical studies or as a collection of experiences by a renowned professional. The third criterion was that all the tweaks have been applied in message

design contexts and do not only originate from empirical research studies. Lastly, I propose a last wish stating that to again minimize noise the tweaks would not come from more than three different sources.

Following these criteria I have selected the work by Susan Weinschenk, a behavioural psychologist with extensive experience in the field of design and user experience. With more than three decades of experience she has written two books based on scientific research and practical examples; '100 things every designer needs to know about people' (Weinschenk, 2011), and '100 more things every designer needs to know about people' (Weinschenk, 2016). Secondly, I've used the 'inSights' cards developed by Wouter Middendorft in collaboration with strategic design bureau Fabrique (Middendorft, 2012). Because the design tweaks do not only aim an aesthetics, but also semantics and emotions I've decided to use another source that is aimed at designing for behaviour change developed by Sander Hermesen and Reint Jan Renes, two researchers from the HU University of Applied Sciences in Utrecht, called 'Ontwerpen voor gedragsverandering'¹ (Hermesen & Renes, 2014). Containing a clear overview of theory as well as directly applicable relevant examples, this source is a good addition to my search. After the design tweak selection from literature, I summarized the tweaks in short sentences and validated these in terms of understanding with a design focus group (elaborated upon in the next paragraph). The focus group consisted out of 4 students in total, as selected by the criteria set in Chapter 2.1. Four students has a background in Industrial Design Engineering (*strategic product design* or *design for interaction* at Delft University of Technology) and two out the four also had a background in Science Communication (at Delft University of Technology).

Although I do not wish to argue that the list of design tweaks is complete or binding, these

tweaks merely act as a suggestion that guide the (inexperienced) product developer towards an actual design for their messages.

Method: Focus group session

The focus group session was set-up to determine the best way to formulate and categorize the design tweaks. To stimulate the four students described above to think for themselves, and to offer them the freedom to come up with new ways an unstructured session was held. In this collaborative session the students were asked the following answers:

1. What do you think each design tweak means?
2. What is the best way to formulate the design tweaks to ease understanding and activate the reader?
3. How should the design tweaks be categorized to make application easier?

The focus group session resulted in the following conclusions:

- Most short explanations were clear and those that weren't were adjusted during the session.
- The best way to formulate the tweaks is through active sentences that directly explain the product developer what to do.
- Categorizing the design tweaks in the three experience components (aesthetic, semantics and emotional) might be too difficult for the product developer. Rather, the students suggested to divide the tweaks into categories that a message consists of, starting at content, then text, then lay-out, followed by call to actions and imagery. In their experience the emotional component was embedded within the categories. The names for the categories were determined during the session.

¹ Literally translates to: 'Designing for behaviour change'

CATEGORIZING DESIGN TWEAKS

The literature analysis, conversations with professionals and focus group session resulted in the following list of design tweaks. For this step of the methodology I decided to add ten design tweaks to each category for the testing phase. During the tool testing session, it will become more apparent which tweaks are useful in what category and how they could be rearranged. A final design tweak iteration will be performed during that stage. The full list of design tweaks can be found in Appendix IX.

There is an endless amount of design tweaks ranging from generic tweaks to very specific tweaks. And to repeat again, some tweaks contradict each other, some are not applicable in every situation, and most certainly not all tweaks work in every situation. But, for product developers who are less experienced in designing these design tweaks can offer some guidance. The design tweaks can be divided into the five different categories described. In the following section I will elaborate on each component in message design and give some examples to clarify how to use design tweaks.

CONTENT

It is important to reduce the content to only what is necessary and most useful for the consumer. Use clear and short headings, that are directly understood (Weinschenk, 2011). Although literature disagrees on the exact number, most agree that people can only process a minimal number of nine items at the same time. Weinschenk (2011) discourages designers to use more than 4 items. If they do, then she advises them to cluster the items. Jones (2002) his mathematical analysis argues for no more than 7 ± 2 items, which also shows there is a limit to what people can process.

In case of a dense content, simplify through action plans (Weinschenk, 2011) or by keeping the consumer curious throughout the information transfer (Middendorf, 2012; van der Stigchel, 2016; Weinschenk, 2011). It's sometimes best to only stick to the strongest arguments.

More arguments dilute the message and give opponents the opportunity to hook onto weaker arguments in their counter (de Vries, Terwel, Ellemers, & Daamen, 2015).

Another way to bring across content is through vivid appeals. A vivid appeal is one that triggers emotions, stimulates the formation of a mental image, and is immediate (Nisbett & Ross, 1980). However, this only work when an argument is strong. Similarly, when using metaphors, framing expert Sarah Gagestein (2018, personal interview) points out they are only effective when the emotional reaction to the metaphor is similar to that of the message trying to bring across. Otherwise, the metaphor has no effect.

TEXT

Although I've argued before that information provision is not the best way to overcome environmental behaviour barriers, adding text is often inevitable. On top of that, it is most certainly not my argument to say using text is wrong. So, when using text, there are some design tweaks to improve a consumers' reaction to the text.

People are often not eager to read, to keeping text short and concise is advisable. If information is important, fonts should be clear and consequent. If a text need to grab a consumers' attention decorative fonts offer a solution (Weinschenk, 2016). Similarly, large fonts, bold letters and special characters attract people's attention (Sunstein, 2014), but one can also use difficult to read fonts because it activates the conscious mind in deciphering the text and improves memory of the content (Weinschenk, 2011).

In determining how to use the words, using a noun instead of a verb creates more interest among the participants. Perhaps this is because it creates the possibility to belonging to a group, which is stronger than the desire to perform an activity as an individual (Weinschenk, 2016). A strategy to bring across important elements of text is to use descriptive norms and replacing words by numbers and symbols where possible. As an example it can be more effective to

replace 'we are the best' by 'we are 1st' (Cialdini & Goldstein, 2002; Weinschenk, 2011).

Even in text small differences that are unexpected can trigger compliance or at least increase attention. This conducted research on a verbal request shows this well. In their research Santos et al asked participants either if they could spare "a quarter" or if they could spare a strange "17 cents". Participants receiving the latter request were 60% more likely to give money than when asked the regular request (Santos, Leve, & Pratkanis, 1994).

LAYOUT

Layout can determine much about the understanding of the message, but also on what gets attention. Clustering the information indicates that items belong together, presenting information in chunks, encapsulating what belongs together are all unconscious indicators for people to ease quick understanding (Hermsen & Renes, 2014; Weinschenk, 2011).

Another layout element that people are keen on is symmetry and grids or separations. Not only in human faces, but also in poster, website, or flyer design. Using white space and placing the key message central all contribute to bringing across the message (Middendorf, 2012; Weinschenk, 2011). However, it is important to know who your consumer because their preferences differ. For example, men prefer symmetry whilst women prefer asymmetrical layouts. (Weinschenk, 2016).

"By making certain comparisons more salient than others, an agent can gain an influence advantage" (Pratkanis, 2007, p. 25) People like to be guided, so thinking consciously about positioning the next step, click of image can have a large effect on what the consumer will do next. For this, it is important to know that most people first look at the left top, then to the right and then downwards (Middendorf, 2012).

To prevent people from having to use their conscious brain, aim for intuitively navigable pages and easily understood follow-up steps. This way, the process of performing a desired

behaviour will not be interrupted by conscious mental negotiating, but rather on automatic compliance (Sunstein, 2014).

CALL TO ACTION

As people like to be guided, there are ways to implement call to actions in the design of a message. What people notice is dependent on their expectations, so knowing what the consumer is expecting when looking at the message can give insights in how to design. Don't place a lot of moving images, infographics and photos on a page where the consumer simply wants factual information. Similarly, don't use only text if the consumer still has low emotional engagement (van der Stigchel, 2016). Similar in lay-out, always present a next call to action for the consumer. "If you have a trade-off on clicks and thinking, use more clicks and less thinking" (Weinschenk, 2011, p. 64). However, when you can offer a default option for the consumer, this can be smart to include.

Call to actions are created by making the next click or step more salient than other options, keeping some information behind to maintain curiosity or use arrows to guide the consumer. No matter what people are looking at, they will always follow arrows and moving object, so if they are used, make sure they guide into the desired direction (van der Stigchel, 2016).

To increase the chance of finishing a process is by giving the consumer an initial boost. Giving people a stamp card where there has already been made a start increased the desire to finish the card, even if the same number of stamps still must be obtained as with a different empty card. Once the consumer has started, a good way to keep them going is through visualizing their progress in a progress bar or showing them how far along the process they are.

IMAGERY

One of the best way to speak to the unconscious mind is through using imagery. Although how people perceive information is dependent on many external factors, there are some tweaks that apply in many situations.

Positive moods lead to an increase in the chance of identification with a message (Pratkanis, 2007). In presenting the message, use colours, images and icons that are happy, positive, or funny. To evoke positive moods it is useful to present role-models who show where to look. It is in people's nature to move attention to where a presented person on an image looks. Because of micro-neurons, we also tend to mimic people their expressions. Showing a video or image of somebody smiling – do note this should be a genuine emotion – triggers the consumer to do the same (Weinschenk, 2011).

4. Solution Development

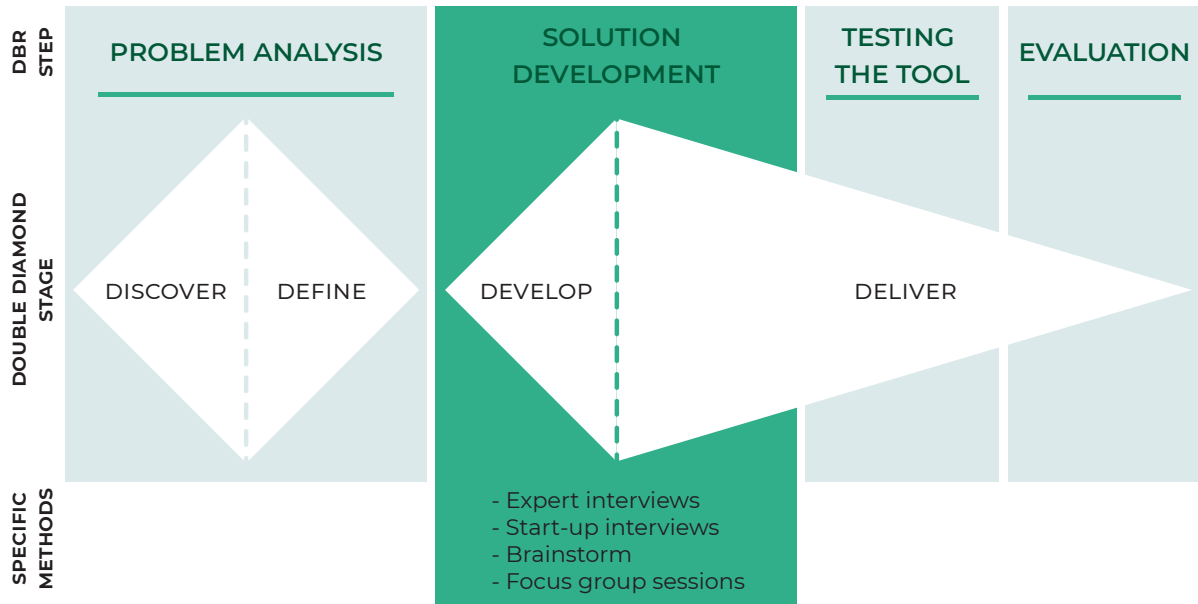


Figure 15 - Highlighting Step 2 of the research methodology

“In order to improve intervention design, we need a systematic method that incorporates an understanding of the nature of the behaviour to be changed, and an appropriate system for characterising interventions and their components that can make use of this understanding”.

— Michie et al. (2011, p. 2)

STEP 2: SOLUTION DEVELOPMENT

To be able to help product developers understand the elements selected in Chapter 3 and to enable them to become practical in overcoming behavioural barriers the elements need to be linked together. This will happen in the second diverging stage of the Double Diamond, initiating Step 2 of the DBR approach (see Figure 13). To do so, the following chapter shows findings from start-up interviews, design requirements for the tool, and explains the determinants of the tool. The tool poster is presented with a sub-chapter on each element explaining the final determinants selection and the relevance of each determinant. I have chosen to only present the outcome of the brainstorm to avoid confusion due to interim designs. As visible in Figure 15 this Step 2 only includes the beginning of the Deliver stage. The rest of this stage will continue in Part 3 where the tool is tested with product developers.

HOW TO READ CHAPTER 4

In the previous step a selection of the four elements and their main determinants are presented. In step 2 the development of the tool, and the tool itself are presented. The following sub-chapters make up step 2:

4.1 Start-up interviews:

Findings from the start-up interviews

4.2 Tool development

Elaborating on the brainstorm process

4.3 Constructs

The constructs that form the foundation of the tool

4.4 Constructs and barriers

The links between the constructs, and presenting the final barriers with an explanation of their significance

4.5 Barriers and Influence mechanisms

The links between the barriers, and presenting the final influence mechanisms with and explanation of their significance.

4.6 Influence mechanisms and design tweaks

The links between the influence mechanisms, and the categories for design tweaks with and explanation, and some examples of practical tweaks.

4.1 START-UP INTERVIEWS

DEFINING THE TARGET GROUP

As stated in the beginning, the goal of this thesis is to develop a tool that will enable product developers to design for pro-environmental behaviour change. The target group for this study includes product developers at sustainable start-ups with a B2C proposition. For an elaboration on the choice of target group and start-up selection see the methodology Chapter 2.1. For an introductory list of the start-ups that participated see Appendix IV. Prior to designing the tool, it is important to analyse the target group on their knowledge and message design process. As explained I will do this through semi-structured start-up interviews. I will find out more about who the target group is, what their current knowledge base is, what they know about their consumers, how they approach their message design, and how a tool could best be designed to fit their needs.

MAIN FINDINGS START-UP INTERVIEWS AND OBSERVATIONS

I've conducted interviews with eight start-ups, and spend time during this thesis at one of these start-ups to observe their daily work processes, as described in Chapter 2.1. Next to using the answers provided by the product developers themselves, I have paid attention to their behaviour during the interviews. To understand more about the behaviour during the interviews I looked for cues from the product developers in their body language, attention span, and general attitude.

These observations contributed to the tool development in deciding the level of interest product developer show, their attention span and their overall attitude towards the tool in terms of its workability. Because the main goal of these interviews was to have an idea of the

knowledge base and need of the start-ups, this interview method was used to dissect general findings that contribute to the design process of the tool. I therefore decided not to elaborate on each interview individually, because the personal situations of each start-up are not necessarily relevant for this thesis. Rather, I see value in the overall findings. Thus, having conducted exploratory interviews with product developer from start-ups, the paragraphs below show the main outcomes that I considered in the further iterations of the tool design process.

Finding 1: Product developers have a focus on the product

Because all the start-ups are selling an innovation that has not yet been established as a standardized product, the focus of all the start-ups lies at the product. This shows in that the focus of external communication mostly elaborates on the development of the product, expressing its benefits and technical specifications. Working on building a network to finance the development or to increase sales opportunities is a second focus.

As the start-ups consist of less than ten employees, in most cases only one or two employees are responsible for the marketing and sales activities. Occasionally they discuss their decisions with the founder(s) of the start-up, but usually only for confirmation of their decision. Most of the start-ups had some sort of consumer profiles defined. All start-ups have taken a moment to define their target group and set-up some sort of consumer journey. It depended per start-up whether they updated this consumer journey and how much they used the outcomes and persona's defined in these journeys. In most cases the start-ups admitted they wanted to use the information

more, but they had little time to invest in specific customer values. They all say that at a later stage they do want to invest more time on this.

So, for every start-up the main focus always lied at improving the product and promoting its innovative specifications.

Finding 2: Product developers work individually and autonomous

What was apparent in most conversations, is that the roles within the start-ups were defined and each employee mainly worked on their own projects of tasks. Although there is plenty conversation going, every individual is responsible for their own bit, and trusted in their work.

Brainstorm sessions and time taken for deeper level thinking are not frequent and employees tend to work more individually than expected. "People like to do the things the way they want to do them, and when they want to do them. People like autonomy. Rather than hiring an expert, people often want to do things on their own" (Weinschenk, 2011, p. 142).

When I asked them about the processes of their marketing decisions, or their consumer support decisions, they mostly responded that one employee was responsible and handled it quite well. "I don't want to be told what to do, I want to find out by myself what works and doesn't work. I just do something, and I'll see what happens later" (Tripp, 2018, personal interview). Most product developers seem to believe that they know what they are doing, and only some seek professional coaching in their external communication.

Finding 3: Product developers rely mostly on gut feeling

Because the start-ups don't seek a lot of external coaching, most explanations of how they came about their decisions were determined by gut feeling. When being asked to explain how their decisions were formed about their latest flyer, website, post or email they had trouble explaining the exact process and responded by

saying they did something that they thought was attractive or effective. Many had to think before answering the question, only one start-up had hired a marketing consultant for additional advice. "When the marketer tells me what tricks to apply I believe him and test it for my company" (Tripp, 2018, personal interview).

Although for all start-ups it was important that they increased their consumer sales, the drive to find out ways to get to know the consumer better was low. Most start-ups hold firmly to their idea of who the consumer should be, instead the customer their personal values.

Finding 4: Product developers make decisions based on reacting on Analytics and pre-contemplation

A reason for the lack of knowledge about their consumer comes from the fact that most of the start-ups focus on data that is readily available. This means, they focus on the data output from online sources such as Facebook, Google Analytics and similar monitoring tools. However, according to Gerard van der Werf (2018, personal interview), who is a senior research consultant at market research bureau Motivation, if companies only use information from Facebook they are basing their decisions on demographics, but this means they are excluding their consumer's intrinsic values. Values are the things that lie close to people and if companies know what these are they can design a message in a way that it addresses these values. According to van der Werf this is more effective than basing a message on demographics.

Also, there is a discrepancy between who the start-ups want their consumer to be and what the start-ups do with that. Each start-up has a clear idea of who they want their consumer to be and make up a profile for that person, but they base their marketing decisions on who visits their web page and Facebook. This means, in some cases they are targeting the wrong people with the wrong messages, simply because they lack knowledge on who their consumers are and what their values are. They don't realize there might be a difference

between their real consumers, their desired consumers and the people that are targeted with their current marketing techniques.

Finding 5: Product developers have a knowledge deficit on their consumer behaviour

Most start-ups also talk about the little time they have to dig deeper into their consumer compared to the work load and due to limiting facilities such as finance or access to their consumers. Simple A/B tests are easily measurable and so are clicks on web pages. They are good indicators for what works and what doesn't, so start-ups are dependent on them. However, in choosing what to A/B test and what a positive or negative result means it seems start-ups have a knowledge deficit.

When talking about the psychology of people their decision-making processes most start-ups don't know much about behaviour. They all say they would be interested to know more about it if it can improve their sales. They are mostly interested in what technique there are and how to know which mechanisms to apply and how to design their message.

Finding 6: Product developers want to be supported in improving their consumer knowledge

Because the start-ups say they don't know a lot about social psychology, offering them a tool could provide additional support. Most start-ups say that they are interested in acquiring more knowledge, but simultaneously they appear to experience a difficulty in knowing what information they need and how much effort they are willing to put into it.

Similarly, because they are so invested in their own product they seem to believe they know how to convince their consumers. But, they also show insecurity in their lack of knowledge, which offers opportunities for help. So, if there could be a tool that takes away this insecurity, but does not require a lot of time or mental capacity, and helps them improve their current practices they all seem interested.

4.2 TOOL DEVELOPMENT

ITERATING BY SWITCHING BETWEEN THEORY AND PRACTICE

By knowing more about how to fulfil the needs of the start-ups this sub-chapter will elaborate upon the putting together of the content of Part 1, expert feedback, and design choices to develop the tool. As Michie et al (2011) describe, in order to design specific interventions it is first necessary to take upon a broad approach from where one can specify. From there the next step is to narrow down and select to design the most effective interventions. With a literary review and practical back-up from experts, I've identified elements and their determinants ready to be used as input for the tool. As explained in Chapter 2.1 the next step is to brainstorm how the elements will be narrowed down, connected and developed into a tool. The elements that are considered important for the tool – behaviour constructs, barriers, influence mechanisms, and design tweaks – need to be put together to achieve a workable tool that can provide product developers better insights in their message framing design. To understand what I mean with a workable tool, I set some criteria. In this sub-chapter I will offer a short approach to explain the design process, elaborate on these criteria and discuss the trade-off between theory and practice for the tool.

AIM OF THE TOOL

In the pre-phase of this these (see Chapter 2.1) I've defined the problem, presented the aim a formulated a research question that I wish to answer. It seems valuable at this point to present a summary of the most important content selected up until this point taken in my study. This includes all the elements and the determinants will make up the tool. To recap on the aim of this study I will first refer to the aim again, to constantly keep in mind

where I want to go during the iterations in the methodological steps. To recite, the aim of this thesis is to:

'Develop a tool that offers insights in message framing for behaviour change to improve communication towards consumers'.

The tool should sufficiently inform or activate product developers to think about their consumers and the message they are trying to convey. I hope that the tool will start conversations and offer new insights on how product developers and frame their messages.

ELEMENTS AND DETERMINANTS

Before elaborating on the tool development and explaining each element of the tool individually, its determinants and the way they are connected to form a complete tool, I want to shortly present a summary of all the elements selected in Part 1 in Table 7.

Table 7- Summary of the element and their determinants from Part 1

	Behaviour constructs	Barriers	Influence mechanisms	Design tweaks	
Elements of the tool	Attitude	Ancient brain	<i>Attitude</i> Emotional steering Attention points Storytelling Scarcity Self-interest Guilt and responsibility		
		Ignorance			
		Uncertainty			
	Social norm	Perceived behavioural control	<i>Social norms</i> Public commitments Social norms Reciprocity Trust Role-model and authority Personal contact Social ranking		<i>Content</i> Tweaks 1-10
		Social comparison			<i>Text</i> Tweaks 11-20
		Social norms and networks			<i>Layout</i> Tweaks 21-30
	Efficacy	Mistrust	<i>Efficacy</i> Autonomy Goal-setting Guarantees Empowerment Feedback Practical facilitation Choice architecture		<i>Call to action</i> Tweaks 31-40
		Functional			<i>Imagery</i> Tweaks 41-50
		Temporal			

BRAINSTORMING

As explained in Chapter 2.1 the method for the tool development was brainstorming which resulted in the development of multiple versions of the tool. When looking at the stages of the Double Diamond, central in this part of the research was diverging into a creative idea development for the tool. This process consisted of constant switching between the theory, expert feedback, designer input, focus group reflections, and start-up interviews.

What this means is that I started with putting all the elements next to each other and trying to connect them according to literature. These connections are then checked with experts and rearranged if necessary (see Appendix XII, phase 1). Once there was a good understanding of the connections, multiple designs on aesthetics were developed that increase understanding and workability for the target group (see Appendix XII, phase 2). During the brainstorm, terms of determinants and explanations were checked on understandability and changed if necessary (see Appendix XII, phase 3). These changes were then validated by experts again. The next step was to include the design aspect and use input from designers to know what makes a comprehensible tool and how to use aesthetics to present all the elements. The focus group session and evaluations contributed here again. After having determined an effective design, the tool was shown to behavioural experts again to check the accuracy. Through such iterations a final proposed tool was developed (see Appendix XII, phase 4). Although this shows a process full of iterations, with many concepts and designs in between, I will not present all these individual steps.

A brainstorm process includes many designs that are unrealistic, will become redundant at a later stage, or do not contribute to the final design, but still are necessary to come to the final proposed solution. I will not present each phase individually, but want to refer to Appendix X for a brainstorm roadmap compilation. The final design will be proposed in this first in this chapter. In the sub-chapters that follow I discuss,

step-by-step, the most important theoretical changes, the design decisions and how the tool has been developed to be workable for product developers.

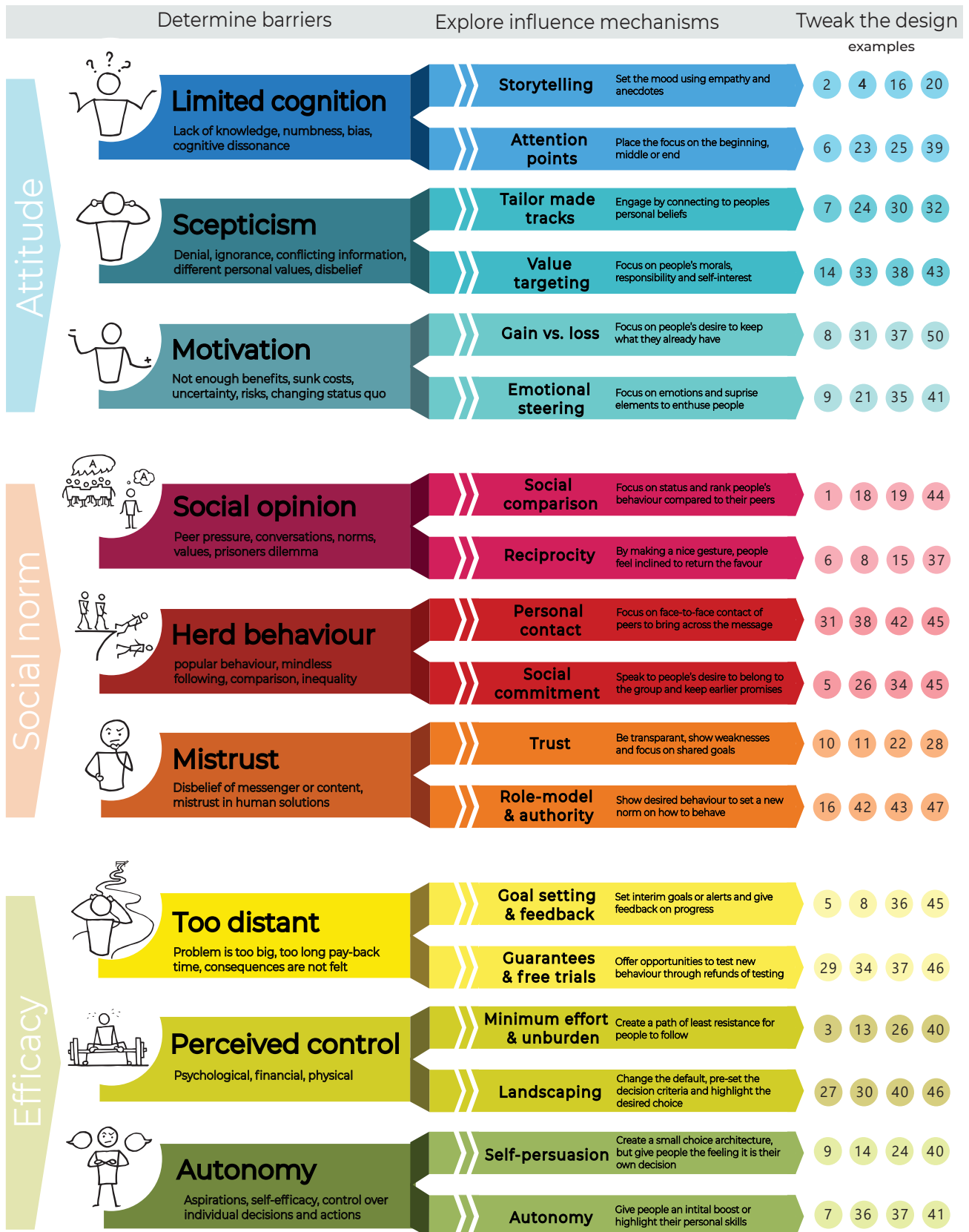
In addition to the tool, and to elaborate of the theory, a booklet was developed. This booklet includes and elaboration on each element, but is mainly focussed on offering an elaboration on the influence mechanisms, offer tactics to implement the mechanisms and present the design tweaks. On the next page the tool poster is presented. The following two pages include example pages from the booklet and short explanations of the element on the pages (see Figures 18 -20).

Each next sub-chapter will elaborate on the next element of the tool until all elements and their connection are discussed.

THE TITLE OF THE TOOL

The title of the tool is the CU-change tool. In order to be attractive to use I propose a short name that easily sticks in people's mind. The name is chosen due to several reasons. The tool brings new insights in both Conscious and Unconscious behaviour influence mechanisms, combining the 'C' and the 'U'. Secondly, the tool promotes active change in not only the end consumer, but also the product developer. This idea is supported in the pronunciation of the tool, sounding like 'see you change tool'. Lastly, the product developers will use the tool to get people to purchase their product of service and become a regular customers, again including the letters of the tool's name. Lastly, because the tool is all about change, I think it's important that 'change' is central in the name and is therefore the main element of the tool's name.

CU-change tool



THE TOOL PRESENTATION

The following two pages explain the tool poster, and the booklet with a construct explanation page, an influence mechanism page and a design trick page.

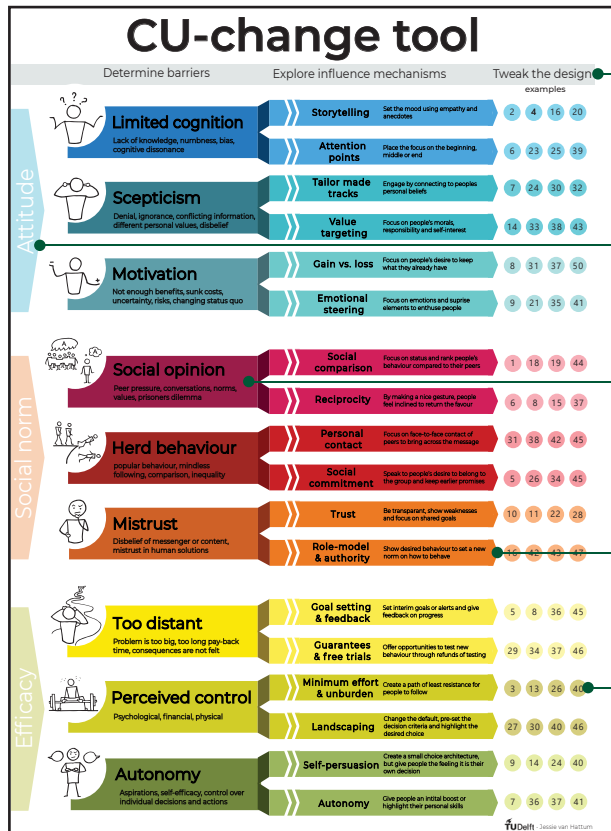


Figure 17 - The tool poster

Steps in the tool usage

Bar indicating the element categories and steps to take in using the tool

Constructs

The beginning of the tool indicates the construct the barriers fall under

Barriers

The barriers organized per construct with visualization and other examples of behaviour that make up the barrier

Influence mechanism

There are two influence mechanisms that can overcome the specific barrier

Design tweaks

Numbers referring to design tweaks that can be found in booklet, and are suggested for to the related influence mechanism

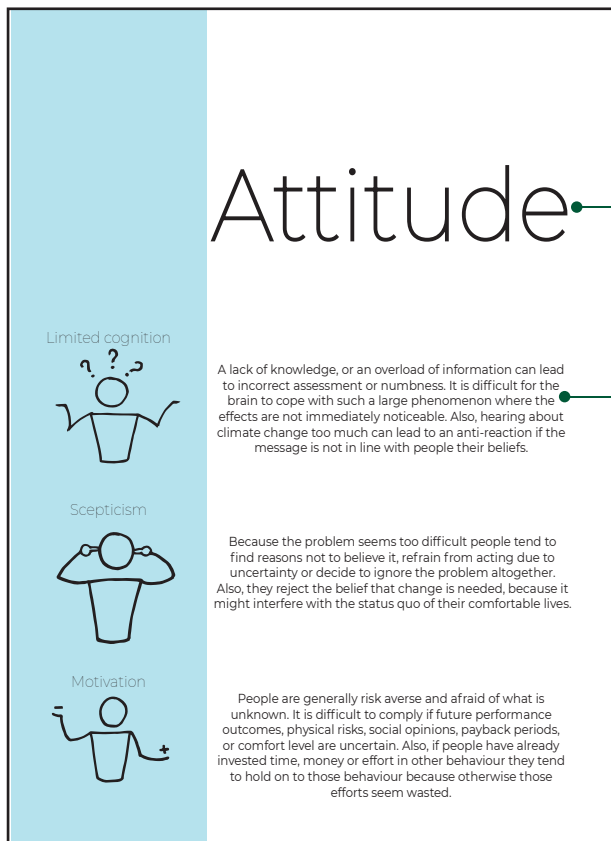


Figure 18 - One of the construct pages in the booklet

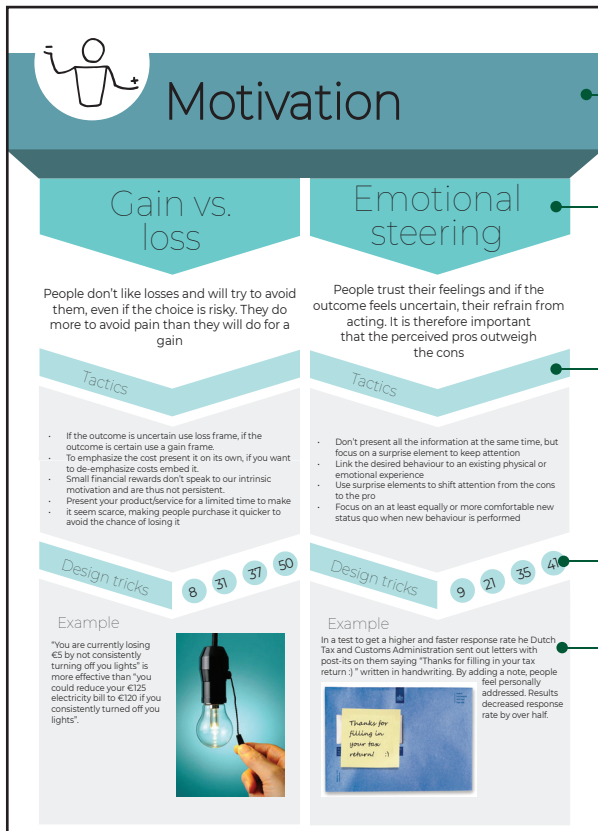
Construct

The main construct indicating the next chapter of the booklet

Barrier explanation

Elaboration on the barriers as background information

Figure 19 - One of the barrier and influence mechanism pages in the booklet



Barriers

The barrier indicated with the same colour

Influence mechanism

The two influence mechanisms with a short explanation of why the influence mechanisms work on consumers

Tactics

Tactics explaining how to apply the influence mechanism and what effects occur

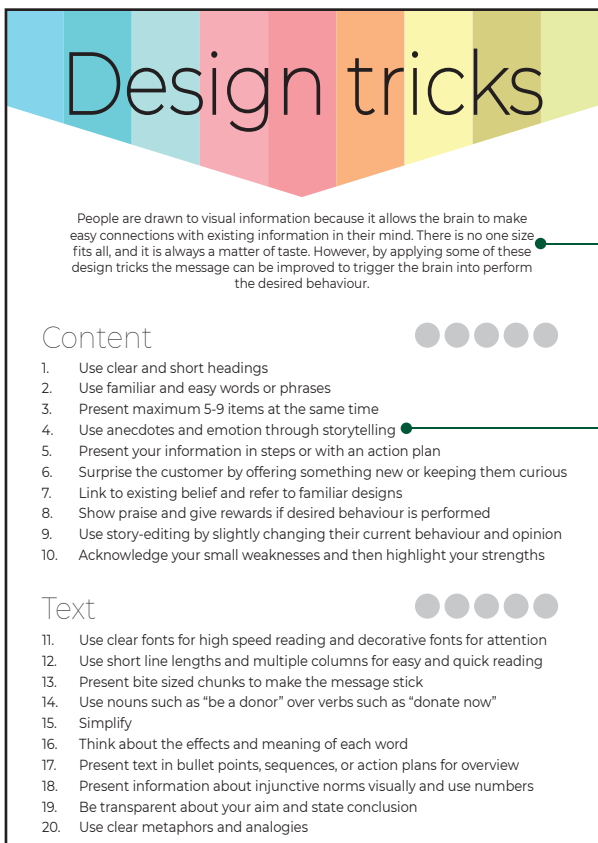
Design tweaks

Numbers suggested for message design

Example

Example of application of the influence mechanism. Ideally these are all aimed at sustainability, but not all have such an example. In the future these can be updated when there are better examples

Figure 20 - The first page of the design tweak pages in the booklet



Design tweaks explanation

Explanation of the importance and application of design tweaks to frame the message

Specific tweaks

Specific design tweaks in five design related categories indicating content, text, layout, call to action, and imagery.

4.3 BEHAVIOUR CONSTRUCTS

FROM THEORY TO TOOL

One of the findings from the start-up interviews showed that product developers are not well educated about social psychology. From that perspective it seems valuable to put the barriers in the tool into context. By presenting background information on the three behaviour constructs, the product developers can learn the basics of human behaviour change. However, the tool is not intended to educate and elaborate on this topic if it doesn't contribute to the tool usage. However, since many theories lean on the TPB by Ajzen it seems valuable to include the three dissected constructs in the model. Although there are more constructs involved in behaviour change, experts (Gagestein, 2018, personal interview; Melchior, 2018, personal interview; Slob, 2018, personal interview; Visser, 2018, personal interview) agree that only presenting those complying with the TPB is sufficient as a first introduction to behaviour change. "It is easiest to stick to the TBP. From here out you can easily determine which are the associated barriers and how you can find mechanisms that influence more unconsciously" (Slob, 2018, personal interview). At a later stage, during discourse, and if the product developer is open to it, further detail can be retrieved in the booklet at the explanation of the constructs and barriers. Similarly, if the interest of the product developer is awakened, more background information can be provided during the tool usage session. But for now, the three constructs that make up the tool are attitude, social norms and efficacy.

TOOL AESTHETICS

In using the model, the three constructs function as ways to look at behaviour change, but should not be perceived as options to choose from. They should therefore not be salient in both

their colour choice, contrast and positioning. For that reason, I've decided to place the construct on the left side, give them a light colour and use white letters. This decreases readability, but also makes the constructs attract much less attention. To increase distinction between the three constructs, I was advised to use a primary colours for each construct (van Beek, 2018, personal interview). This way, people can focus on one colour type to decrease information overload.

4.4 CONSTRUCTS TO BARRIERS

FROM THEORY TO TOOL

In the exploratory literature review, from the in total 29 barriers proposed by Gifford (2011), nine were chosen as most applicable for my study: ancient brain, ignorance, uncertainty, perceived behavioural control, social comparison, social norms and networks, mistrust, functional, temporal. However, as becomes visible in the model, throughout the tool development brainstorm phase, there were some alterations made in the barriers. Not because they were theoretically not accurate, but because in some cases a reformulated or altered version appeared more suitable for comprehension or connectivity possibilities to a construct. Not all the barriers that Gifford proposed were suitable to use in a tool the way he presented them, so altering them to fit them as three barriers per each construct resulted into the current barrier selection. Although Gifford doesn't divide his barriers according to these constructs, I've decided to split the barriers into three groups that fit the constructs to simplify the understanding the barriers for the product developers. Since the influence mechanisms

are divided according to the constructs, it seems like a logical step to also divide the barriers to fit the constructs. This helps to minimize the mental overload of required to process nine elements at the same time.

According to one of the designers, making a colour distinction between the three constructs makes it easier to focus on only the barriers connected to that construct (van Iersel, 2018, personal interview). Table 8 shows the alterations made to come to the final barriers selection. To clarify, this decision was part of the design process and was verified by expert for theoretical correctness (Geiger, 2018, personal interview; Hoekstra, 2018, personal interview; Slob, 2018, personal interview). In chapter 3.3 each term from column one is explained, and throughout the rest of this sub-chapter the revised and final barriers are elaborated upon. In the next section I will describe the changes made to get from the barrier list created in Step 1 to the final barrier list that complies with the theoretical as well as practical desires.

Table 8 - Revised and final barriers for the proposed tool

Barriers from Step 1		Revised barriers for in the tool	Behaviour construct
Ancient brain	→	Limited cognition	Attitude
Ignorance	→	Skepticism	Attitude
Uncertainty	→	Motivation	Attitude
Perceived behavioural control	→	Perceived control	Efficacy
Social comparison	→	Social opinion	Social norm
Social norms and networks	→	Herd behaviour	Social norm
Mistrust	→	Mistrust	Social norm
Functional	→	Autonomy	Efficacy
Temporal	→	Too distant	Efficacy

ATTITUDE

FROM ANCIENT BRAIN TO LIMITED COGNITION

Not having the details, or the capacity to deal with all the details makes people fall back on using their primitive unconscious brain (Gifford & Comeau, 2011). However, "only a small fraction of pro-environmental behaviour can be directly linked to environmental knowledge and environmental awareness. The majority of pro-environmental behaviour is due to situational and intrinsic factors" (Kollmuss & Agyeman, 2002, p. 250). This means that environmental knowledge is not necessarily a prerequisite for pro-environmental behaviour (Bamberg & Möser, 2007), as Kempton et al. (1995) also discovered when performing a study on the level of environmental knowledge compared to environmental behaviour of US citizens. However, with the excessive use of smart phones, and social media and our ability to always stay in contact with information sources is endless. For this barrier I don't want to focus necessarily on information provision, but rather expand this barrier to include a lack of knowledge due to missing the right information of having an overload of information. When lacking information or getting an overload of information, people simply switch back to their ancient brain, which is why this is an important barrier. To overcome this barrier, I want to find influence mechanisms that do not speak to rational reasoning, but can overcome this knowledge barrier in different ways.

The first attitude barrier is named *limited cognition* and includes a lack of knowledge, numbness, bias, and cognitive dissonance. The term limited cognition is preferred over ancient brain because it is more comprehensive to the product developers.



FROM IGNORANCE TO SCEPTICISM

Ignorance either comes from not knowing that the problem exists, or from not knowing what to do (Gifford, 2011). Not knowing what to do can be explained due to the variety of mixed messages expressed by the media and our peers. Also, when a message is repeated frequently it is more likely to be accepted due to mere exposure (Boehm, 1994), the risk is that it leads to overexposure harming its credibility and leading to countering the message or numbness (Gifford, 2007; 2011; Pratkanis, 2007).

People who have a strong selfish and competitive character are less likely to find interest in pro-environmental behaviour because it has no direct personal consequences (Kollmuss & Agyeman, 2002). On top of that, "it is very difficult to change the attitudes of receivers who are highly committed to their positions on an issue" (Fleming & Levie, 1979, p. 261). These people justify their ignorance by prioritizing self-interest, where basic level of needs is more important than societal needs (Groening et al., 2018).

The behaviour experts often replaced ignorance with scepticism because ignorance is a reaction to scepticism. "When people are sceptical about a problem like global warming, a simple solution to avoid it is to ignore it" (Melchior, 2018, personal interview). For this tool, this barrier concerns people distancing themselves from the problem because they don't want to believe the consequences and rather stick their heads in the sand. Conflicting information can be a cause of this, but on a more intrinsic level mixed personal values can play a role as well. People stick to what they know and focus on information supporting their current belief. Examples of this barrier are denial, ignorance and disbelief. So, in conversation with experts (Slob, 2018, personal interview; Visser, 2018, personal interview) the term *scepticism* was selected.



FROM UNCERTAINTY TO MOTIVATION



Where scepticism is, to some extent a choice not to accept the problem, uncertainty is a more passive state in which the decision making is too difficult (Gifford, 2011). The brain constantly makes unconscious decisions. When there are multiple options, people sometimes need deliberate consideration. When there are many options, the task can get too difficult resulting in indecisiveness, discomfort or even behavioural paralysis (Tversky & Shafir, 1992). There is also a large group of people not believing the sustainability discourse because they have the feeling the benefits are very low, too expensive, and a hype that will pass (van der Werf, Visscher, & Königs, 2015). When the benefits are too low the utilitarian outcome is negative and the brain will not be energized enough to be motivated for change (Michie et al., 2011). Another effect of the indecisiveness of the conscious brain is that our brain loses attention resulting in what is called a “yeah whatever-heuristic” (Thaler & Sunstein, 2008, p. 35). Decisions become too difficult so the brain decides not to care anymore and refrains from further decision making on the problem.

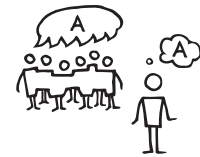
In conversation with the experts, uncertainty is closely related to the utilitarian sum of positives and negatives (Slob, 2018, personal communication). This is the summation of rewards and punishments resulting from performing behaviour (Fransson & Gärling, 1999). Emotional uncertainty, which can be addressed through unconscious influence mechanisms, is a contributor to the outcome of this utilitarian summation. Uncertainty increases the chance of acting in self-interest, changing the utilitarian trade-off (Gifford, 2015). If we would only address uncertainty for this barrier, increasing intrinsic motivation so that it becomes higher than the negatives is a way to overcome uncertainty (Gifford, 2010).

In iterations the word disincentive was chosen, because it reflects the lack of incentives that inhibits the desire to change, it being both

cognitive and emotional incentives. However, in the focus group session this term did not clarify the barrier sufficiently. As motivation is often referred to by experts as crucial in changing attitude as well as behaviour change, I decided to adopt the term *motivation* for this barrier. In this case, it would then suggest a lack of motivation or a too high motivation in performing the undesired behaviour.

SOCIAL NORM

FROM SOCIAL COMPARISON TO SOCIAL OPINION



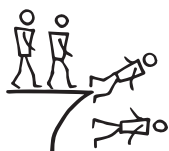
Although people want to feel autonomous, they constantly compare their behaviour to that of others (Festinger, 2014). What others say and do sets the bar on how to act, in fear of not fitting in when the comparison results in the person being the oddball (Pentland, 2015). In general, nobody wants to be a misfit. “One reason why people expend so much effort conforming to social norms and fashions is that they think that others are closely paying attention to what they are doing” (Thaler & Sunstein, 2008, p. 60) Therefore, in some situations, the reason for refraining from pro-environmental behaviour may be as simple as that it negatively affects one’s social status because it is seen as un-cool (Groening et al., 2018).

An important element of social comparison that can form a barrier is the social dilemma, sometimes referred to as the tragedy of the commons. “Each person brings a cow to graze at a common grassland (small positive outcome), but the combined effect is that the commons is destroyed through overgrazing (long-term negative outcome)” (Pratkanis, 2007, p. 29) It is important that people do not feel trapped by the free riders’ problem where others will reap the benefits from their actions.

Since everybody can spread their opinion worldwide within seconds, people are constantly seeking social confirmation in their opinion, and they are most likely to switch when their peers have changed opinion likewise (Groening

et al., 2018). Therefore, I've expanded social comparison to *social opinion*. If the 'general opinion' of peers is negative, it can form a great barrier for an individual to alter their opinion, let alone their behaviour, in contradiction to that of their peers.

FROM SOCIAL NORMS AND NETWORKS TO HERD BEHAVIOUR



Social comparison finds its existence in the formation of social norms and networks. Norms are forces that drive certain beliefs that will strengthen and pass on in networks (Gifford, 2011). So next to personal norms and morals, a person is constantly affected by surrounding norms. Some researchers argue that social norms have larger effects on pro-environmental behaviour than personal norms (Groening et al., 2018; Pentland, 2015), whilst others argue it's the opposite (Ajzen, 1991). It is hard to determine which claim is true, but we do know that people their behaviour is often determined by what others do. For example, "if you see a movie scene in which people are smiling, you are more likely to smile yourself (whether or not the movie is funny)" (Thaler & Sunstein, 2008, p. 54).

People are social animals and, just like most species living in groups, prefer to live together and imitate each other's behaviour. Herd behaviour can make people do things they would never be do if they were alone (Groening et al., 2018). Take this example. In the 1950's social psychologist Solomon Asch asked people a set of seemingly obvious questions. When answering by themselves participants never erred. But, when they were put in a room with strangers who were instructed to give wrong answers, the participants erred more than 30% of the time. This shows, without knowing, people respond to the decisions of others, even strangers they have no reason to be liked by (Thaler & Sunstein, 2008).

Socially acceptable behaviour and pro-environmental behaviour share a common characteristic which makes the social norm construct very important for this tool. They

both originate from altruistic values (Bamberg & Möser, 2007). It is in people their best interest to act along with the group, because if others have already performed a behaviour it shows safety, acceptance and sets the norm on how to behave. Because environmental benefits are not always in favour of self-interest or show short term benefits, peer pressure can be of added benefit. I've therefore assigned two barriers to cover the social pressure element. Whereas the last barrier had a focus on opinion, this barrier is aimed at more unconscious following. The term I choose for this barrier is *herd behaviour*.

MISTRUST



According to Gifford (2011) trust is essential in relationships and without it resistance to a message will always come to play. Mistrust is often fed by a lack of perceived stability and fairness by the messenger (Pentland, 2015). If the consumer does not see the message to have the stated effect and value for the consumer as the messenger claims (Gifford, 2011). Also, if the role-model differs too much from the consumer or when the level of trust between the messenger and the consumer is low, the consumer is less likely to be susceptible to a new behaviour (Pentland, 2015).

People sometimes just 'follow their gut' and choose 'what feels right'. In these cases, mistrust in the messenger can result in inaction, regardless of the specifications of the product (Gadenne et al., 2011). Some people who don't trust innovations and don't want to see change, will use the 'not in my backyard' argument, placing the possible consequences of innovation is somebody else their shoes (van der Werf et al., 2015).

All start-ups have developed a product that is either an innovative product, a service that requires belief in a new technology, or a product that has not yet proven its functional benefits. Mistrust is a barrier that often occurs amongst consumers, according to most product developers (Nefkens, 2018, personal communication; Porthøjne & van Eeden,

2018, personal communication; Roode, 2018, personal communication; Tripp, 2018, personal communication; van Beek, 2018, personal communication; van Iersel, 2018, personal communication). For that reason, start-ups have the tendency to tell the consumer about the quality of the product, but that does not always overcome mistrust. The reason why this barrier is high is that people are change averse because of the future uncertainty. Also, when the explanation comes from the source selling the product, consumers can be sceptic of the message content, or simply mistrust the solutions at whole. I, therefore, keep this term as *mistrust*, as experts have frequently mentioned its importance and possibility to apply influence mechanisms to overcome this.

EFFICACY

FROM TEMPORAL TO TOO DISTANT

Temporal risk is the risk of spending time on changing a behaviour to later find out the perceived expectation is not met (Gifford, 2011). Purchases should feel cost effective, and if the benefits lie too far in the future, the nearby costs will overshadow these benefits (Gadenne et al., 2011; Gifford, 2011). It is easier for people to oversee short-term effect, and in case of the distant global warming problem it might feel easier not to try because they can't foresee the long-term effects (Groening et al., 2018). "Even changes that would theoretically be noticeable, for example loss of species, often go unnoticed by the layperson...very often, we only perceive changes once the human impact has already caused severe damage" (Kollmuss & Agyeman, 2002, p. 253). It is therefore difficult for individuals to believe small contributions have effect at larger scale. Without immediate pay-back we feel ineffective and will thus be more likely to refrain from action in the future.

Some researchers suggest that the difficulty of the temporal distant problem of sustainability can only be solved if altruism is enforced in people (Groening et al., 2018). This means that they need to 'actively care'. Barriers that play



a role are self-efficacy, belonging and identify (Kollmuss & Agyeman, 2002; Stern et al., 1999).

The term temporal was very hard to understand for all target group participants, because most had never heard of the term before. In conversation with experts, temporal was used multiple times but in different wording. Most frequently mentioned alternatives included too long payback time (Handgraaf, 2018, personal interview; Visser, 2018, personal interview), long term problem (Hovestadt, 2018, personal interview), distant consequences (Hoekstra, 2018, personal interview), and a distant problem (Handgraaf, 2018, personal interview; Lingsma, 2018, personal interview; van der Werf, 2018, personal interview). In offering the focus group participants an explanation of the term accompanied by the proposed expert term, the choice for the term *too distant* was made.

FROM PERCEIVED BEHAVIOURAL CONTROL TO PERCEIVED CONTROL

Perceived behavioural control determines if somebody feels their actions can bring about change (Gifford, 2011). It is determined by a person's actual and perceived capabilities; both psychological, physical as well as practical (Stern, 2000). It is not a static perception, but it varies with different contexts, situations, and actions (Ajzen, 1991; Bandura, 1992) making efficacy malleable and influenceable. Even if a consumer has green values, if their perceived control is low their intentions and pro-environmental behaviour can remain low (Lee, Kim, Kim, & Choi, 2014).

People can change, but for some reason feel limited in their mental capacity or skills set to do so. As experts confirmed, this barrier is very important because it is a great reason for the attitude-action gap. People are prone to take the path of least resistance (Thaler & Sunstein, 2008). So, if the messenger can make the desired action the easiest path this barrier can be overcome. In the focus group session, the term was easily understood so I decided to only alter the name to *perceived control*. The reason to shorten the term was due to an



aesthetic reason, because for the design of the tool having terms that are similar in length improves to visual perception of the poster.

FROM FUNCTIONAL TO AUTONOMY



If the infrastructure to change behaviour is not in place, many people will refrain trying to behave pro-environmentally because it will take too much effort (Kollmuss & Agyeman, 2002). Functional risks are part of the perceived risks barrier group Gifford (2011) described. Within this group there are also physical and psychological risks which are often mentioned and confirmed by all behavioural experts. Psychological risks come forth from fear of others forming a negative opinion about their behaviour or mental barriers such as ignorance and uncertainty. Physical risks are those that concern the actual physical limitations, but also difficulties such as installation. Another element important to perceived behavioural control is the feeling of autonomy. When people do not feel free in choosing, their feeling of autonomy is affected, affecting their independence, confidence, individualist and positive self-efficacy (Ryan & Deci, 2000). Not feeling autonomous can form a behavioural barrier in being forced into a certain fit.

I shortly want to elaborate upon the financial investment problem. "Economic factors that play into people's decisions are very complex and only poorly understood...economic factors are intertwined with social, infrastructural, and psychological factors" (Kollmuss & Agyeman, 2002). When asking people, they often mention costs as a barrier, but this is because costs are tangible and are one of the few measurable considerations to making pro-environmental decisions. There are many studies confirming the importance of the financial barrier according to Gadenne et al. (2011). Others argue that there is evidence showing that economic benefits overshadow intrinsic motivation (Groening et al., 2018; Ryan & Deci, 2000). However, during this study I chose to refrain from putting emphasis on this barrier. For product developers, there

is little possibility of changing the cost of their product, especially when the product is in its early stage. By showing product developer there are other, more unconscious, mechanisms that can overcome the functional barrier, I take away emphasis from the financial argument. Instead of functional risks, I've decided to focus with this barrier to *autonomy*. People think they are in control over their own decisions and actions (Hurd, 2005), and want to have the power to control this. If they feel pushed in their opinion or behaviour, which is a risk in talking about sustainability too much (Gifford, 2011), their self-efficacy drops. Conflicting goals and values also stimulate confusion and hinder autonomous decision making (Gifford, 2007).

TOOL AESTHETICS

Since the constructs were divided into three distinctive colours, the three barriers belonging to one construct group should have a colour in the same range according to the designers (van Beek, 2018, personal communication). This means that since Attitude is blue, the respective barriers should also be blue. Because barriers are the starting point of the tool usage, I decided to add simple drawings portraying each barrier. Not only do these drawings attract attention, they also clarify the barrier visually. By giving each barrier a different colour, the tool gets a multi-coloured look, which creates a positive vibe and attracts attention (Portheijne & van Eeden, 2018, personal communication; van Iersel, 2018, personal communication). The shape of the constructs indicate an arrow towards the barriers (Weinschenk, 2016). Since people read from left to right (Middendorf, 2012), the shape automatically guides towards the right leading the reader to the two influence mechanisms connected to each barrier.

4.5 BARRIERS AND INFLUENCE MECHANISMS

As the literature study already showed in Part 1, the identified influence mechanisms were categorized according to the three constructs. Most experts did not categorize the influence mechanisms per barriers, but could more easily assign each mechanism to a construct. Behavioural expert Visser (2018, personal interview) suggested to only pick the most relevant and comprehensive mechanisms per barrier or construct because in her experience too many mechanisms are too confusing for the product developers. According to her suggestions, and confirmed by other

behavioural experts (Geiger, 2018, personal interview; Slob, 2018, personal interview), I've decided to select two influence mechanisms per barrier.

In this sub-chapter I will show the final selection and connections of the influence mechanisms and discuss any significant changes in specific terms. I will elaborate upon the connections made and discuss how I offer more information to the product developers through examples and tactics related to each mechanism. Table 9 below shows the separate determinants

Table 9 - Revised and final influence mechanisms connected to barriers for the proposed tool

Influence mechanism		Revised influence mechanism	Barrier	Construct
Storytelling	→	Story telling	Limited cognition	Attitude
Attention points	→	Attention points		
Self-interest	→	Tailor made tracks	Skepticism	
Guilt & responsibility	→	Value targeting	Motivation	
Scarcity	→	Gain vs Loss		
Emotional steering	→	Emotional steering		
Social norms	→	Social comparison	Social opinion	Social Norm
Social ranking	→			
Reciprocity	→	Reciprocity	Herd behaviour	
Personal contact	→	Personal contact		
Public commitments	→	Social commitment		
Trust	→	Trust	Mistrust	
Role-model & authority	→	Role-model & authority		
Goal-setting	→	Goal setting & feedback	Too distant	Efficacy
Feedback	→			
Guarantees	→	Guarantees & free trials	Perceived control	
Practical facilitation	→	Minimum effort & unburden		
Choice architecture	→	Landscaping		
Empowerment	→	Self-persuasion	Autonomy	
Autonomy	→	Initiation		

selected in the literature review, their revised version and the barrier they are linked to.

An important characteristic of the tool is the connection between the individual elements. For this part of the design process I had to figure out how to connect the influence mechanism to the barriers linked to each construct. To do so, I started with referring to literature, leaning most towards Pratkanis' (2007) explanations of the different mechanisms. In his explanation of the mechanisms he often explained what kind of behaviour the influence mechanism could change and which barriers would therefore be overcome. This resulted in a first draft with connections between barriers and influence mechanisms. I then validated this with behavioural experts. Once this process was completed and each barrier was assigned two influence mechanisms, I again consulted the focus group with the four design and communication students (see Chapter 2.1 for the selection) to determine which terms or explanations were difficult to understand and adjusted them to increase intuitive comprehension for the product developers.

ATTITUDE

LIMITED COGNITION

Storytelling

One effective way of presenting information is through storytelling. Next to being enjoyable, stories have the ability to make plain information understandable, enthusing and memorable (Weinschenk, 2011). If stories are told right, they can redirect a person's mind to a different path without it costing them deliberate consideration, but by aiming at a person's emotion. In order to tell the story right the messenger needs to understand what the current 'self-story' of the consumer is, and how to make the story credible and guide thought (Pratkanis, 2007). From there out, storytelling elements such as metaphors, anecdotes, videos and narratives can be used to edit the self-story and prepare the consumer emotionally to a change behaviour (Weinschenk, 2016).

Another power of storytelling is to depersonalize a request by placing another person central and removing the discursive characteristics of the message (Pratkanis, 2007).

Attention points

As our unconscious mind makes most of our decisions, we seem to rely very much on heuristics and mental short cuts. One way the mind simplifies is by filtering information to try to select only the important information. So, it matters in what order the information is presented. In some cases, for instance when the message has a high personal relevance, people tend to remember best what comes first (primacy effect). People are more likely to remember what came last (recency effect) in a situation where the message has low personal relevance (Fleming & Levie, 1979; Haugtvedt & Wegener, 1994). So, these moments offer opportunities to hook on a message. I call these moments attention points. Next to the beginning and the end, attention points can also be created. For instance, in a lengthy process it can be smart to insert an extra peak (something surprising, a required quick decision, or a next click) to keep or redirect the consumer's attention (Weinschenk, 2011).

SCEPTICISM

From self-interest to tailor made tracks

Because people have a high self-interest, finding out what their values and beliefs are and how they have shaped their attitude is important. It's also important to know what rating the consumer gives to each value to know the perception of the consumer on the extent to which the message can harm or benefit each value. Knowing all this gives guidance as to what personal values are successful to highlight and what values are not (Fleming & Levie, 1979) "Show the receiver how an existing need can be satisfied by adopting your point of view. People are generally quite amenable to having their existing needs met" (Fleming & Levie, 1979, p. 214).

According to Pilaj (2017) one of three ways in which the perceived personal benefit can be increased is through highlighting social

benefits in terms of identity (what it says about the consumer). Central for this influence mechanism is not what the messenger wants the consumer to find important, but what elements make up the identity of the consumer and what points the messenger can respond to the existing values of the consumer. Another way to refer to this principle is value targeting where you “praise the things the receiver likes (e.g. freedom and peace) and criticize the things the receiver dislikes (e.g. crime and taxes)” (Fleming & Levie, 1979, p. 213).

From guilt & responsibility to value targeting

The utilitarian benefit is the sum of the pro's (or rewards) and the con's (punishments) that result from considering or performing the new behaviour (Fransson & Gärling, 1999). Although Pratkanis (2007) argues that guilt, embarrassment and ridiculing are mechanisms to evoke self-consciousness, I want to refrain from these mechanisms in the tool. This is because in sustainable behaviour the risk is that pointing out wrong behaviour and guiltling the consumer can increase efficacy barriers due to the big and distant characteristic of the climate problem. Crompton & Kasser (2010) explain that literature shows guiltling can cause inaction due to inaction or behavioural numbness. An intuitive response is to refrain from the problem, denying it, pointing the finger at others (such as policy makers), or seeking for more pleasurable activities (living for today, personal happiness first). Guilt and responsibility speak to people's intrinsic motivation which is the desire to seek new challenges, improve on one's personal skills and explore through learning (Ryan & Deci, 2000).

MOTIVATION

From scarcity to gain versus loss

A simple mechanism that is embedded in every human being is that they don't like the risk of losing something. People will try to avoid loss if possible (Cialdini & Goldstein, 2002; Houde & Todd, 2010), sometimes even at high cost. People are even willing to take uncertain risks in order to keep what they have. Messengers can directly incorporate this loss aversion in

their sales by showing that if the purchase is not made, the consumer will miss out. Tactics for this are presenting items as if they are in short supply, or if they are only limited available for a certain price (Cialdini & Goldstein, 2002). Scarcity can be linked to loss aversion because when products are scarce people their feeling of freedom of choice is taken away. Because people want to keep their free choice, their desire to own that product might greatly increase even if they never intended to having that product (Cialdini & Goldstein, 2002). More disguised tactics appear in formulating offers. 'You are currently losing €5 by not turning off your lights' is more effective than 'you could reduce your electricity bill by €5 if you turn off your lights'.

Another deeply implemented trait in our brain is that people are loss averse, meaning they are uncomfortable with the feeling of losing something. Although people might think the value they give a product is dependent on the product, this is not always true (Thaler & Sunstein, 2008). Consider this next example. When a parent offers a child €10 if they have passed a test, the kid will either pass it or not. However, if the parent would first pay the child the same amount of money, but with the notion that if the kid fails the test they must give the €10 back, the likelihood of the kid passing the test doubles. Because the €10 is already in the child's possession the fear of losing the money is a bigger driver, than if they would have to work to gain the money.

This loss aversion also appears in how we deal with opinion formation. It's not the lack of information that is difficult to change, but the way people deal with what is currently available in their mind. Since people are loss averse, they tend to stick to what they know and only focus on information that support their current belief. This is called cognitive dissonance. Cognitive dissonance is a rational approach to justifying one's (bad) behaviour. This either happens when the bad behaviour is difficult for people to adjust (quit smoking) or when they have had to work hard to achieve something (Fleming & Levie, 1979). Cognitive dissonance is a smart

mechanism by the brain to constantly keep its beliefs in place, supporting the ancient brain barrier without people realizing.

Emotional steering

“An emotional appeal is one that uses the message recipient’s subjective feelings, affect, arousal, emotions and tension-states as the basis for securing influence” (Pratkanis, 2007, p. 50). Influencing through emotions is effective because emotions are easily created and triggered without the necessity of creating a specific situation, because when emotions are experienced the psychological processes that follow allow other mental processes such as opinion formation, judgment, and choice to be open to change. So, through provoking a certain emotion and then offering a way to deal with the situation one can redirect the behaviour.

Since the consumer is so busy with dealing with the emotion there is no room to critically judge the proposed desired behaviour and chances of compliance increase (Petty & Cacioppo, 1986; Pratkanis, 2007). “Persuasion will be enhanced if the receiver is in a positive frame or engaged in an enjoyable activity” (Fleming & Levie, 1979, p. 241). This explains one of the three ways Pilaj (2017) described that improve perceived personal benefits: increase emotional perception (how it makes the consumer feel).

Another way to address emotion is through empathy or flattery. People like those who flatter them, but they are also more inclined to do others a favour after that. This shows the effects of intra-personal influencing. On a similar level can empathy increase the likelihood of compliance to requests by that person (Pratkanis, 2007). In an article on how likeability can influence a waiter’s tip, Michael Lynn (1996) explains how elements such as smiling, touching, lowering to the consumer’s level, drawing a smiley on the bill and personal contact can increase the tip by almost 20%. Researchers agree with this, arguing that “physical attractiveness, similarity, cooperation, and the extent to which we feel the person likes us” are most important to interpersonal attractiveness (Cialdini & Goldstein, 2002).

SOCIAL NORM

SOCIAL OPINION

From social norms & social ranking to social opinion

As people determine their behaviour according to others, they are very susceptible when they are shown how their behaviour compares to that of others. Several researches about energy savings have shown this effect. Presenting homeowners with their energy use compared to their neighbours increase the change of saving energy (Casado, Hidalgo, & García-Leiva, 2017; Cialdini & Schultz, 2004; Houde & Todd, 2010; Schultz, 1999; Udalov et al., 2017). This strategy is used by utility information platform OPower. By presenting homeowners with their energy use compared to their neighbours, OPower stimulates - without forcing - homeowners to decrease their energy use if they performed worse relative to other (Allcott, 2011). A downfall of this technique is that homeowners that performed better than their neighbours started to increase their energy use. However, other researchers (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007) showed in their research that by adding a simple smiley to reinforce good behaviour this effect could be countered.

The best way to approach people's personal norms is through altering social norms. Social norms provide proof of what should and should not be done. In social norms there is a simple rule: if other people are doing something, it must be right (Pratkanis, 2007). Having another opinion than peers can influence somebody's image and have psychological effects making a person feel unaccepted or experience status loss (Groening et al., 2018). In a research Schultz and Cialdini (2004) showed the effect of using a social norm as a reference frame, having more effect in decreasing energy use than an informative, social responsibility, sustainability, of self-identity frame. Social norms can easily be used in selling products. By showing people what their peers like ('others also bought'), the chance increased that people will start liking that product too. This is called collaborative filtering and can be applied for many products and services (Thaler & Sunstein, 2008).

Reciprocity

It is deeply embedded in our nature to return a favour. If a person does something for another, it is natural to expect a similar favour in return. "Invoking this rule triggers a feeling of indebtedness or obligation to the person who has given a gift or performed a favour" (Pratkanis, 2007, p. 52). Reciprocity is not only limited to giving gifts, but also making concessions to emotionally favour one other. This mechanism finds its simple appearance in many recognizable settings. Take for instance a free tasting sample at the market, a small gift right after a purchase, a surprise gift inside a delivered package, or personal discount on your birthday. In receiving such gift, the likeliness of an intrinsic need to repay the favour grows.

But, there are also more elaborate ways to apply reciprocity to achieve specific behaviour. An example is to create feelings of indebtedness through offering an initial deal first, quickly followed by a better deal. In a study about this, researchers discovered that when a waitress offered guests a piece of chocolate at the end of their meal, the tip increased. When the guests were offered two pieces of chocolate the tips remained the same. However, the feelings of reciprocity were highest when the waitress offered just one chocolate and insinuated on walking away, but deciding last minute to turn around and offer a second chocolate. It seemed this simple manoeuvre made guests feel the waitress put extra effort in their visit feeling personally complimented (Strohmetz, Rind, Fisher, & Lynn, 2002). By suggesting a that's-not-all interaction people are more eager to purchase a product because it feels like a good deal being offered to them (Pratkanis, 2007).

A well-known mechanism is the foot-in-the-door technique where one first asks for a small favour to then ask for a bigger favour which was the initial goal all along. In research on safer driving, Freedman and Fraser (1966) asked residents from a specific neighbourhood if they wanted to place 'drive carefully' sign in their yard. Less than 17% complied. However, when they were asked to place a small postcard sign in their houses several weeks earlier, 76% of

all residents then complied to the larger sign afterwards.

Following the similar mental processes, but in an opposite way there is the door-in-the-face technique. If you first ask people for a too big request which they will most likely reject, but follow up with a smaller request (the one which you wanted in the first place), people are more likely to comply with the second request than if you would start with the second request. This is, because after rejecting a favour, which decreased people their likeability, they feel obliged to make a concession to restore their identity (Pratkanis, 2007). However, this only works if the first request is within moral limit.

HERD BEHAVIOUR

Personal contact

Communication is not only about transferring information verbally or in written form. In a conversation, 80% is transferred through body language. All this is lost when human contact is missing in interactions. The value of personal contact should not be underestimated (Cialdini & Goldstein, 2002). Again, likeability and trust play an important part here, but it also makes it harder to decline a request made by a person than made by a computer screen. Also, the earlier the personal contact, the easier it is to prevent wrong mental decision processes from occurring (Locke & Latham, 2002). It is difficult to have personal contact with every potential consumer individually, so a solution could be to make use of community leaders and inter-community promotion. A community leader spreading an opinion increases the tendency to perform a behaviour without careful consideration (Houde & Todd, 2010).

This collaborative filtering is closely related to herd behaviour. People are constantly trying to fit in (Pentland, 2015). In many cases it does not matter what the performance is, if others do it, people are more likely to follow without actively contemplating the effects. Examples of such behaviour can be found everywhere in real-life. Originating from the ancient reaction that if people focus their attention on something, we should too because it could

be potentially dangerous. So when there is a situation where everybody around you is looking in one direction chances are you will do the same even if you don't know what people are looking at (Pratkanis, 2007). "We frequently look to others for cues on how to think, feel, and behave, particularly when we are in a state of uncertainty" (Cialdini & Goldstein, 2002, p. 47). Show consumers what others do, and they will easily follow. To prove the strength of peer behaviour Peter Reingen (1982) showed that when a group of researched when door-to-door asking for a donation the rate of compliance correlated positively with an increased length of an accompanying list showing neighbours that also complied.

From public commitments to social commitments

A mechanism that comes forth out of people their reciprocity instinct, is the tendency to stick to their commitments. Houde and Todd (2010, p. 6) refer to commitments as "informal contracts that individuals voluntarily agree upon". By doing so, people find it harder to refrain from trying to achieve set goals. The commitment doesn't have to be big, a click, like or verbal commitment can be enough for a bigger commitment later. Commitments work because people don't like to break their promises. Not keeping their promises will make people look untrustworthy and inconsistent, negatively influencing people their image (Pratkanis, 2007).

Asking for even the smallest commitment can be effective, because it eliminated excuses such as not having enough money to donate, and make a person feel heartless if they don't give anything (Pratkanis, 2007). In an collection campaign to raise money for cancer, Cialdini and Schroeder (1976) highlighted that even a penny would help, which noticeably increased the percentage of money donated. In an article, Cialdini and Goldstein (2002) give an example of the power of small commitments versus a simple request. A Chicago restaurant owner was faced with the dilemma to solve the problem that 30% of their phone reservations ended up as no-shows. In reconsidering the conversation structure, the owner decided the change the

notion 'please call in case you want to cancel' to a question asking, 'will you please call in case you want to cancel?' This small change resulted in the no show rate to drop to only 10%. This happened because people want to be consistent in their actions according to what they say so having made the commitment to call required them to keep to that promise.

Another way to make commitments even more effective is by making them public, increasing the importance of the commitment. The chance of people agreeing to something they don't necessarily want will increase significantly if their peers also make the agreement. And once the agreement is made, it's hard to back down (Thaler & Sunstein, 2008). If people are held publicly accountable it is harder for them to refrain from purchasing a sustainable product or complying to a pro-environmental behaviour because it influences their image (Groening et al., 2018). Another way to improve the effect of commitments is to set the commitment to an exact moment in the future, setting a clear goals and motivating people to stick to it to prevents failure (Sunstein, 2014).

MISTRUST

Trust

Trust more often depends on emotion rather than facts. Trust comes from a disbelief in credibility. It is therefore influenceable through several mechanisms. There are many mechanisms to overcome credibility: authority, attractiveness, doing a favour, agreeing with the target, demonstrate, personalize, showing the future is inevitable, familiarity, proximity, surrounding yourself with beautiful people, sharing secrets, and being perceived as empathetic (Fleming & Levie, 1979; Pratkanis, 2007). Some of these techniques also appear in other mechanisms, but the most important aspect is to address the feelings consumers experience, and knowing if mistrust can be overcome through hard tactics (experts' explanation, authorities' pressure, social status judgement) or soft tactics (convincing by being attractive, likeable, or similar) (Cialdini & Goldstein, 2002; Pratkanis, 2007). These soft tactics are discussed in the attitude influence

mechanisms, because they address internal processes and personal interest. One simple additional tweak to increase credibility is to show a weakness. This shows honesty and integrity, after which the presentation of a strength gets more value (Fleming & Levie, 1979). In the next section I will elaborate on the effect of more hard tactics to improve trust.

Role-model or authority

Next to people being shown norms by their peers, they are also programmed to follow people who seem to know more about a topic or by authorities that set rules. "We tend to defer to the counsel of authority figures and experts to help us decide how to behave, especially when we are feeling ambivalent about a decision or when we are in an ambiguous situation" (Cialdini & Goldstein, 2002, p. 49). On an even more biological level, when research compares what happens in the brain when a person is performing an activity compared to what happens when they see somebody else performing the activity, they see that the same parts of the brain light up. So, by showing a person the desired behaviour, our brain is programmed to accept that behaviour and imitate it. In neuroscience, this effect is produced by so called mirror-neurons (Acharya & Shukla, 2012). Although there is still uncertainty about whether the human brain actually contains these neurons, the article describes that many researchers agree on the effect of showing desired behaviour. This is why it is successful to use images of role-models, famous people, or an authority figure performing the desired behaviour. However, we must be wary of bias effect. Only when the authority figure is liked by the receiver or comes across as genuine do we trust their opinion. When people have the feeling the authority figure has dishonest motives a strong opposing reaction might occur.

EFFICACY

TOO DISTANT

Goal-setting & feedback

An important mechanism in goal setting is help setting expectations. "Expectations serve as a

reference points by which opinions are judged (and) guide interpretations and perceptions to create a picture of reality that is congruent with expectations" (Pratkanis, 2007, p. 23). Based on their expectations people determine the difficulty of the task and the prospect on whether they can achieve it within an given time. In case of distant or difficult task, setting interim goals can increase self-efficacy.

Through goal setting less deliberation or thinking throughout the process is required, and the easier it becomes to achieve it (Weinschenk, 2011). If a person has to perform a difficult task or make a complex decision, commitment to reaching the goal can be increased by setting interim goals, stimulating not the threat of failure but the challenge of achieving success. Or by stimulating learning during the process. Or by presenting an easy to follow action plan (Locke & Latham, 2006). For complex tasks, setting learning goals can sometimes be more effective than performance goals (Locke & Latham, 2002). In the case of alarming consumers on global warming problems, give consumers concrete step they can take to reduce the chance of them ignoring the problem due to uncertainty of what to do (Sunstein, 2014). Simple action plans, clear visual guides and showing progress of a process are all simple tactics to enforce goal-setting as an influence mechanism.

"The best way to help humans improve their performance is to provide feedback" (Thaler & Sunstein, 2008, p. 90). Feedback should be given as soon as the action has occurred and can take many forms as long as it stimulates positive emotions. Thaler and Sunstein give a simple example that shows how feedback can make a task emotionally less straining. When painting the ceiling the same colour, it is sometimes hard to see if there are any spots that have not been painted yet, either forcing you to paint more than perhaps necessary or leaving the risk that once the paint has dried the missing spots annoyingly show up. A way to solve this by giving instant feedback was paint developed that showed a pink colour when wet, but white when dried. This way, during painting

you are given instant feedback on any missed spots, improving the experience of performing the paint job and increasing motivation to finish the job. This makes the task much more rewarding. Rewards give people a good feeling so can be used to give reinforcing feedback (Bamberg & Möser, 2007).

However, rewards do not always have a positive effect. In some cases, they lead to over justification of a behaviour. This means that extrinsic rewards can undermine intrinsic rewards, leading to a disincentive to continue performing the rewarded behaviour (Ryan & Deci, 2000). As an example, in researching behaviour of Dutch homeowners in their energy used, Handgraaf et al (2013) compared giving monetary rewards (€0-5) versus social rewards (a score with commentary) and showed that social rewards outperformed the monetary rewards. The same research showed that financial incentives can sometime overpower intrinsic drivers such as morals, and when the financial incentive is stopped so will the behaviour.

[From guarantees to guarantees & free trials](#)

Since feedback is only effective when the behaviour has been performed, a difference influence mechanism is needed in case efficacy is a problem prior to the desired behaviour. One mechanism is through giving a guarantee. Offering guarantees can decrease both scepticism and practical boundaries by giving the feeling people get a chance to try out a product or service without any obligation. With this, a person's reluctance is acknowledged, accepted and comforted by allowing the person to simply try it out to then decide (Pratkanis, 2007). Ideally by using the product, the new behaviour will become the new status quo.

In doing so, the consumer will never feel forced to the new status quo, increasing the likelihood of acceptance. Another example of a guarantee is a free trial, as already mentioned in the reciprocity section. Offering a free sample of a new product decrease the threshold to trying it out as well as triggering curiosity.

PERCEIVED CONTROL

[From practical facilitation to minimum effort & unburden](#)

Practical facilitation occurs in many discourses about why people are reluctant to change behaviour. It can be easy for people to blame other external factors for their inaction. To overcome this, a solution is not to address the factors discussed by the consumer, but take away some of barriers that unconsciously occur. People follow the path of least resistance so taking away physical and mental barrier lowers the threshold to comply (Blake, 1999). The fewer practical boundaries the less additional stimulus people need, so taking away practical boundaries is a good mechanism to activate people (Gadenne et al., 2011; Kollmuss & Agyeman, 2002; Pilaj, 2017). A good way to do this is through setting the right choice architecture.

[Choice architecture to Landscaping](#)

Thaler and Sunstein (2008) explain the principles of choice architecture as offering incentives, understanding mappings, setting defaults, giving feedback, expecting errors and structuring complex choices. People make decisions dependent on what is available. As messengers have the power to decide how to present the information given to the consumer, they also have the power to steer the decision-making process (Pilaj, 2017). When people face a difficult decision, reducing mental effort in decision making can help overcome low perceived self-efficacy and focus on the unconscious mind to perform a behaviour (WWR, 2017). There are multiple experiments showing that reducing the number of option increased the chance of compliance because the choice becomes easier (Houde & Todd, 2010).

Another method in deciding between two options is to add a third decoy option. This third, undesired option, makes the second option suddenly look like the best option. Say a store would offer two bottles of wine, one for €10 and one for €30, many people will find the €30 rather expensive. However, when there is a third

option of a €50 bottle of wine, the €30 bottle will suddenly not feel as expensive anymore. Nothing changed about the bottle that made it more favourable apart from the choice architecture. By changing the comparison to a different reference point the level of resistance can be reduced. However, this mechanism can boomerang if the new reference point is not in line with the motivation of the consumer (Pratkanis, 2007).

Another, even easier way to unburden a consumer in choosing is via a default. A simple example of this is the donor registry. In countries where the default is set to opt-in, the number of donors is much lower (about 20%) than in countries where the default is set to opt-out (about 90%). This is true even if the countries have very similar demographics (Houde & Todd, 2010). "Research shows that whatever the default choices are, many people stick with them, even when the stakes are much higher than choosing the noise your phone makes when it rings" (Thaler & Sunstein, 2008, p. 8).

AUTONOMY

From empowerment to self-persuasion

Empowering through self-engagement and inclusion of personal decision-making can be an effective mechanism to overcome inaction through a lack of efficacy. One way to create feelings of responsibility without attacking the person is through asking rhetorical questions or predicting personal behaviour (Sunstein, 2014). By pre-setting the question, the receiver will automatically be steered in a direction. In case of a rhetorical question they have committed to an answer and feel the need to act consistent. And when a person is asked to predict a certain possibility of performing their own behaviour, "the respondent seeks to reduce the discrepancy between what was predicted and his or her behaviour" increasing the likelihood of an improved behaviour (Pratkanis, 2007, p. 56). People who are stimulated to think about arguments that support a specific decision are more likely to be persuaded by themselves than if the arguments were presented to them by others (R. Miller & Wozniak, 2001).

Autonomy to Initiation

When people feel threatened in their decision making freedom they are more likely to reject a proposition. One way to overcome this is by simply ending a proposition with adding 'but you are free to choose', which can result in an increase in compliance by a factor of five (Guéguen, Silone, David, & Pascual, 2015). As people internalize pro-environmental propositions due to self-persuasive mechanisms, the propositions become part of their identity resulting in stronger motivation to support and sustain them (Ryan & Deci, 2000). Autonomy can enhance intrinsic motivation because it increases perceived locus of control. One should rather focus on making autonomy salient than extrinsic rewards, because the latter tends to undermine intrinsic values which inhibit genuine motivation (Ryan & Deci, 2000). Thus, by increasing a person's feelings of autonomy the likelihood of their intrinsic motivation to unconsciously increasing at the same time is very high.

TOOL AESTHETICS

After reading the barriers, the user should automatically be guided to the two influence mechanisms connected to the barrier. This is insinuated by splitting the rectangle in two bars. This split is supported by a change in colour indicating a next 'level' is reached and by implying a 3D effect. Simultaneously, this design creates more white space between the influence mechanisms, making the information easier to read and remember. A second use-cue is found in the form of the white arrows. These stimulate users to continue following the two splits and read the text presented. The end of the influence mechanism bar is not cut off straight but has an arrow shape, consistent with the white triangles before the influence mechanisms. This indicate that there is a next step to be taken: the design tweaks.

4.6 INFLUENCE MECHANISMS AND DESIGN TWEAKS

FROM THEORY TO TOOL

In Chapter 3.5 I've selected a list of 50 design tweaks that can contribute to helping product developers in transforming influence mechanisms into practical message frames. A goal of the tool development was connecting all the elements to help product developers progress from barrier understanding and new insights on know-hows for implementing this in framing design. To make this last step, the selected design tweaks had to be connected to influence mechanisms. In this sub-chapter I will describe the process of coupling the design tweaks to the influence mechanisms and the lack of literature to facilitate this. I will end the sub-chapter with arguing why I decided to still incorporate the design element in the tool despite the lack of theoretical justification.

LITERATURE DEFICIT

Although there are many descriptions of design tweaks that can be applied for consumer behaviour change, they are usually mentioned in isolation. Like in Weinschenk's books (2011, 2016), the design tweaks are presented as stand-alone tricks that can have an influence on the message perception of the consumer. However, they are rarely connected to barriers they overcome or influence mechanisms they work well with. When digging deeper into design theory and research on the effects of design tweaks in consumer experience, the effects between a direct behaviour and a design choice is not available for many tweaks and influence mechanisms. Even talking to designers resulted in the conclusion that there is not a lot of theory where such coupling is made, because the 'right' design choice is not dependent on the coupling made, but on a specific situation and in that specific context (van der Togt, 2018, personal interview).

COUPLING DESIGN TWEAKS TO INFLUENCE MECHANISMS

Since I did not find enough theoretical support, I can't justify the coupling of design tweaks to influence mechanisms through theory. However, I did want to offer a preliminary support to product developers that enables them to apply their newly gained behaviour change insights into their framing design. Each of the influence mechanisms present applications to frame a message in order to overcome a barrier. All product developers agreed that presenting a clear example of an influence mechanism improves their understanding of how to apply these in design. However, they also argued that when looking at the example they found it hard to translate this for personal reference.

To increase understanding and resolve difficulties with translating examples to product developer's personal information, I've decided to couple the design tweaks as examples to the influence mechanisms. From each example, I picked out the design tweaks that matched the example to the influence mechanism. So, I listed the number of the design tweaks that were used to enforce a specific influence mechanism to overcome a barrier. Because people can process a maximum four items at the same time (Cowan, 2001; Weinschenk, 2016), but also because I want to show the product developers that there are always more design tweaks that can be applied I decide to present an equal amount of design tweaks for every influence mechanism.

AN EXAMPLE

To overcome the autonomy barrier, product developers can initiate the desired behaviour. The example given was to offer consumers a stamp card where there are already two stamps obtained. Research has shown that pre-stamped card increased the consumer's desire to finish the card and thus increase sales. The design tweaks (see Appendix IX for the full list) applied here are:

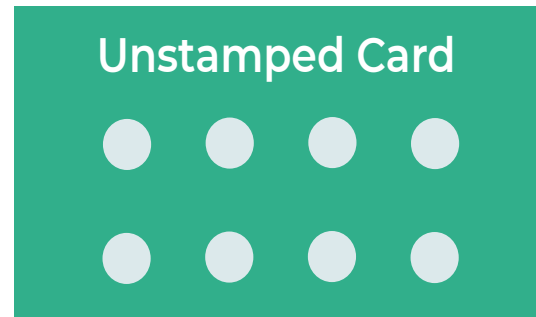
- 7 Link to familiar design (people know intuitively what to do with a stamp card because they have seen it before)
- 37 Give consumer initial boost (By already filling in several stamps, people recognise what is expected of them)

In this case, there are only two design tweaks applied in this example. Therefore, two additional design tweaks are selected that are often applicable to include to help with implementing this specific influence mechanism.

- 36 Show that people can click on information or use buttons to indicate action
- 41 Focus on attractive images and positive moods

TOOL AESTHETICS

Because there is no hierarchy in the design tweaks, I wanted to avoid a design that included arrows that suggest that one follows the other. Instead I chose to encapsulate the number of the design tweaks in circles. The circles make the poster more interesting because they break the rectangular character of the rest of the poster. The choice to include only numbers is due to on two reasons. The first is to keep the consumer curious and make them curious to look at the tweaks in the end. The other reason is to simplify the poster, because more text would make the tool too dense to understand.



versus



Pre-stamped reward cards stimulate more purchases than unstamped cards, even if the same amount of stamps are needed

Figure 21 - Example of an applied design tweak

5. Testing the tool

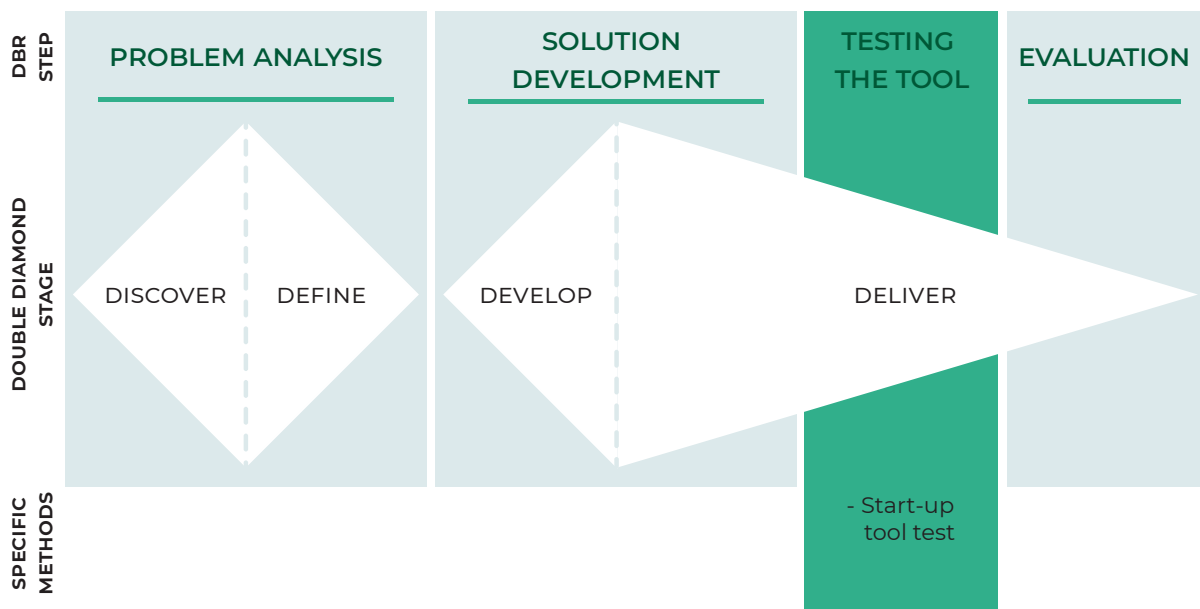


Figure 22 - Highlighting Step 3 of the research methodology

“Discover useful issues, such as errors and misunderstandings, possible improvements to resolve those issues and opportunities to improve the safety and the user experience of your design”.

— van Boeijen et al. (2013, p. 133)

STEP 3: TESTING THE TOOL

After having performed a literature review, selecting relevant elements for tool, developing and designing a tool through multiple iteration it is time in this chapter to continue with the third DBR step; testing the tool (see Figure 22). As visible, this test contributes to the last converging stage of the Double Diamond; delivering the end-product. This step will consist of a product developer user test set-up, an explanation of the user tests with the product developers from multiple start-ups described in Chapter 2.1, and an evaluation of the results. In this evaluation I will assess whether the tool meets the requirements set in step 2 (see Chapter 4.2). The result of the user tests in this step can then be used to make content, comprehensibility, design and user suggestions for further tool improvement and evaluate the accuracy versus workability of the proposed tool.

HOW TO READ CHAPTER 5

Part 3 presents a case study of the tool usage, the tool test set-up, and an elaboration on the results according to the pre-set requirements. I will start with recapping what is already known about the start-ups and then the requirements for the tool will be presented together with the process of the test. The requirements will serve as a guide to discuss the results and to be able to determine the success of the design of the tool. Step 3 will end with a chapter on top and tip that I've derived from the tests. The sub-sections are presented as follows:

- 5.1 Using the tool
- 5.2 Testing the tool
- 5.3 Presenting the results
- 5.4 Suggested improvements

These sub-chapters which will help to answer the main research question on the last Step 4 where the full study will be discussed and evaluated.

5.1 USING THE TOOL

FROM TOOL TO PRACTICE

Now that the tool has been introduced and explained, I want to present an example of the usage in practice through an example session. I will do so by walking through the process as would happen in an actual session. This explanation is accompanied by a case from De Energiebespaarders (as introduced in Chapter 2.1). This real-life test case and was developed together with the product developer from De Energiebespaarders in a real-life session.

SESSION STRUCTURE

The goal

Increase the knowledge of product developers about how to design for behaviour change by giving them new insights in sustainable behaviour barriers, influence mechanism and design tweaks for message framing.

Participants

- Moderator (experienced with the tool kit)
- Product developers (one or more product developers from a sustainable start-up)

The session

The session was set-up and performed as described in Appendix V, and is summarized below to get a quick overview of the steps taken.

1. Setting the scope
During the beginning of the session details about the type of media output messages will be discussed and determined, followed by an elaboration on the type of consumer that will be addressed and the specific desired behaviour of that consumer.
2. Using the tool
This is the main part of the session and will consist of the following steps:
 - Determination of applicable barrier(s)
 - Investigation of influence mechanisms related to the barrier(s) using the booklet
 - Brainstorm on opportunities with suggested tactics for the start-ups case

3. Framing the message

After the tool use, or at the end of the session, the insights gained and ideas generated during the tool use are used to lead the message framing design process to design the output determined in the beginning of the session.

DE ENERGIEBESPAARDERS: ACCEPTING THE OFFER

SETTING THE SCOPE

The media output message

When consumers visit De Energiebespaarders' website to check out what renovation solutions could be suitable for their house they have to answer some questions about their house after which they are presented with renovation suggestions. If they are interested in some of the suggestions De Energiebespaarders will present them an online offer which the consumers must accept. This exact page, the offer-page, can increase in effectiveness and is taken as the message for the session. According to the product developers most potential consumer that reach this page do not accept the offer (van Beek, 2018, personal communication). Therefore, he has chosen this point as the message that was analysed during the tool session. Figure 23 shows the current offer-page the consumers see when they have passed the first steps of the consumer journey, and shows the starting point of this design session.

The consumer

De Energiebespaarders has developed several persona's that are all potential consumers. They are divided into two groups. First there is the 50+ middle class male who is interested in sustainability, had the financial resources and has the motivation to invest time in looking for innovations that can improve his living environment. This persona often finds De

Energiebespaarders' website by active search. The second type of consumers are young professionals that have just purchased a house. During this big life change they are more open to changes, and since they are already investing in a new house, they are willing to invest more if it could make the house more sustainable. They are up to date with the need for pro-environmental behaviour, or see value in the payback time of renovation innovations. Although the start-up has defined different persona's, they only have one website and one type of content output for both target groups.

Similar to most similar young start-ups, De Energiebespaarders regularly assess their consumer behaviour on the data of the website visits and funnel of the journey (van Beek, 2018, personal communication). However, they don't yet do a lot with this information and do not know what exactly moves or hinders their consumers during the consumer journey. Since the message chosen is the point where the consumer gets the offer, we know the potential consumer had already spend some time on the website and shows at least curiosity or some interest in their service. This means they have filled in the questions about their homes and are interested in seeing how much potential solutions cost, perhaps they are already interested in accepting the offer. Because the same offer is presented to both persona's of the consumer target group, and De Energiebespaarders have not yet analysed data on which persona seems to refrain from accepting the offer more than the other, both target groups will be addressed for this session.

The knowledge about the consumer is taken further in this session focuses on the point where they drop out, after having already spend energy on getting to the offer and only needing to accept it in order to successfully have passed through the whole consumer journey.

THE SESSION

Barrier determination

At this point in the session the tool kit will be first used, starting with the tool poster, and using the booklet for additional support. During the

session the main barriers that were identified for this specific case were scepticism, mistrust and perceived control. Scepticism was chosen because people might not believe that this offer is the best offer for them, mistrust because people might not believe that the information is honest and genuine, and perceived control because people find it difficult to click on accept because it is a big commitment and they must choose if this is the right thing for them to do or not.

Influence mechanisms

When assessing the influence mechanism that are connected to the barriers, and after consulting the booklet the following influence mechanisms were chosen to take a further look on in the design:

- *Scepticism*: because people might be sceptic about this offer being the best option for them personally focussing on tailor-made tracks to increase the consumers' feeling of self-interest could overcome the feeling of the offer not being best for them.
- *Mistrust*: when people get a home visit they are more willing to sign the offer right away (van Beek, 2018b, personal communication). The consumer might miss an authority figure explaining the information or misses getting support in their big decision by having personal contact during this decision point.
- *Perceived control*: people are not sufficiently activated to click the accept button because they might feel like the effort will still be too much, so attracting them more to the accept button and landscaping the button to activate the consumer could be helpful.

Tactics and idea generation

In the continuation of the session the booklet was consulted again to look at specific tactics and the accompanying design tweaks to come up with ideas that could improve the design of the offer-page. When discussing the tactics, we also analysed what was currently on the page that could possibly enhance the chosen barriers and had potential to be changed. By walking through the offer-page the product developer gained insights in use-cues and hidden

effects that he had not realized he had placed on the web page (van Beek, 2018, personal communication). Influence mechanisms that there were considered throughout the session were as follows:

- *Tailor made tracks*: when people feel personally addressed, their self-interest increases. By personalizing the message, or engaging the consumer the offer can feel more personal to the consumer.
- *Role-model or authority*: when people are being told what to do by an expert they feel more comfortable in their decision-making, so by showing an expert's guidance or showing a similar person having successfully proceeded to the next step can take away mistrust and comfort the consumer.
- *Landscaping*: making the next step, in this case accepting the offer, more salient by highlighting the desired next step or present pre-selected criteria that lead to the desired decision can stimulate the consumer unconsciously.

FRAMING THE MESSAGE

After the session the product developer had sufficient ideas to make a redesign of their offer-page using some of the tactics and design tactics suggested by the tool. In this last step, I asked him to come up with a re-frame of the message discussed in the beginning of the session. Figure 23 shows the initial design of the web page, and Figure 24 shows the changed design after the tool was used. The changes are indicated with a letter and a short explanation. Additional information on the adjustments are explained below per separate element.

- A. To make the offer more personal, the offer code is changed from 'Offer 146-141' to 'Your personal offer for solar panels'.
See design tweak 2 (use familiar and easy words).
- B. People perceive a warning sign as negative, this was removed to avoid people from refraining due to an unconscious reaction.
See design tweak 44 (think about the effect of icons & symbols).
- C. By placing a photo of the expert on the offer with a personal message, the personal

contact increases and positive trust is evokes.

See design tweak 42 and 42 (show role-model, evoke emotion through people).

D. By rephrasing the desired step people are more attracted to accept.

See design tweak 14 (use nouns over verbs).

A
Impersonal offer

B
Negative warning sign

C
No indication of trustworthy information

B
Not activating next click

DE ENERGIEBESPAARDERS

OPLOSSINGEN MIJN ENERGIEPASPOORT MIJN ACCOUNT

Mijn mogelijkheden Mijn offertes Mijn Energiepaspoort™ Mijn gegevens

← TERUG NAAR OVERZICHT

Offerte 146-141

16 full-black Winaico hoogrendementspanelen van 300Wp inclusief SMA omvormer en installatie

⚠ Deze offerte is geldig t/m woensdag 6 juni

Beste meneer de Jong,

De meeste winst in uw woning valt te halen uit het laten installeren van zonnepanelen op uw dak. Met 16 hoogrendementspanelen op het dak boven de keuken kunt u op een duurzame manier 3070 kWh opwekken. Zoals tijdens ons gesprek al naar voren kwam kan er in de schil van uw woning weinig verbeterd worden wat zich op redelijke termijn terug zal betalen, of wat een significante toename zou betekenen in uw wooncomfort. Mocht u in de toekomst plannen krijgen voor een wat grotere verbouwing of renovatie van uw woning dan wordt er weer een boel mogelijk. Wij nemen uw situatie dan graag opnieuw onder de loep om mee te denken over de mogelijkheden. Ook als u nog andere vragen heeft op het gebied van energiebesparing helpen we u graag.

Met duurzame groet,
Leo van De Energiebespaarders

PRODUCTENMERKEN

- ✓ Hogere opbrengst dankzij SMA omvormer
- ✓ Inclusief WiFi connectiviteit
- ✓ 15 jaar garantie op de panelen

GARANTIES

- ☆ **Productgarantie:** 15 jaar op de panelen en 5 jaar op de omvormer
- ☆ **Installatiegarantie:** 1 jaar op de installatie

JAARLIJKE BESPARING	EENMALIGE INVESTERING	JAARLIJKS RENDEMENT
€ 710,00	€ 6.656,00*	6.6%

* Na btw-teruggave
Deze verdient u binnen 9,4 jaar terug

TOENAME WOONCOMFORT
☆☆☆☆☆

U wekt met dit zonnestroomsysteem jaarlijks 3070 kWh op. Dit levert met een elektriciteitsprijs van €0,23/kWh een jaarlijkse besparing op van €710.

Uw huidige maandbedrag van €239 wordt met deze installatie ruim 25% lager, voor een nieuw maandbedrag van €180. Dat zorgt ervoor dat je de investering in 9,4 jaar terugverdient.

Bovendien vermindert u uw CO₂-uitstoot met 1,74 ton CO₂ per jaar. Dat staat gelijk aan 13 keer naar Parijs vliegen, 556 liter diesel verbranden of 27840 km met de trein reizen. Een mooie bijdrage aan een groenere toekomst dus!

Hieronder ziet u wat de installatie met het energielabel van uw woning doet. Een woning met een beter energielabel verkoopt sneller en voor meer dan een soortgelijke woning met een slecht label, dus dat is mooi meegenomen!

Product	Aantal	BTW	Subtotaal
16 full-black Winaico hoogrendementspanelen van 300Wp inclusief SMA omvormer...	1	21%	€ 6656,00
Totaal excl. BTW			€ 6656,00
BTW 21%			€ 1397,76
Totaal incl. BTW			€ 8053,76

BELANGRIJKE INFORMATIE

- FINANCIERING EN SUBSIDIES +
- GELDIGHEID VAN DE OFFERTE +
- GARANTIES +
- MONTAGE EN COÖRDINATIE +
- DENKT U OOK HIERAAN +

Mocht u omtrent de verstrekte informatie of anderszins vragen hebben, dan verzoeken wij u vriendelijk contact op te nemen via telefoonnummer 085 210 3977. Er kunnen geen rechten worden ontleend aan eventuele typfouten in onze offerte.

Offerte verloopt op woensdag 6 juni

AKKOORD MET OFFERTE

Figure 23 - The current offer-page of De Energiebespaarders

DE ENERGIEBESPAARDERS

OPLOSSINGEN | MIJN ENERGIEPASPOORT | MIJN ACCOUNT

Mijn mogelijkheden | **Mijn offertes** | Mijn Energiepaspoort™ | Mijn gegevens

← TERUG NAAR OVERZICHT

Uw persoonlijke offerte voor zonnepanelen

16 full-black Winaico hoogrendementspanelen van 300Wp inclusief SMA omvormer en installatie

Beste meneer de Jong,

De meeste winst in uw woning valt te halen uit het laten installeren van zonnepanelen op uw dak. Met 16 hoogrendementspanelen op het dak boven de keuken kunt u op een duurzame manier 3070 kWh opwekken. Zoals tijdens ons gesprek al naar voren kwam kan er in de schil van uw woning weinig van betaald worden met zich op redelijke termijn terug zal betalen, of wat een significante toename zou betekenen in uw wooncomfort. Mocht u in de toekomst plannen krijgen voor een wat grotere verbouwing of renovatie van uw woning dan wordt er weer een boel mogelijk. Wij nemen uw situatie dan graag opnieuw onder de loep om mee te denken over de mogelijkheden. Ook als u nog andere vragen heeft op het gebied van energiebesparing helpen we u graag.

GARANTIES

- ☆ **Productgarantie:** 15 jaar op de panelen en 5 jaar op de omvormer
- ☆ **Installatiegarantie:** 1 jaar op de installatie

PRODUCTBROCHURES

- Winaico_mono300p_WSP-M6
- SMA_Sunny-Boy_30-50

PRODUCTMERKEN

- ✓ Hogere opbrengst dankzij SMA omvormer
- ✓ Inclusief WiFi connectiviteit
- ✓ 15 jaar garantie op de panelen

JAARLIJKE BESPARING	EENMALIGE INVESTERING	JAARLIJKS RENDEMENT
€ 710,00	€ 6.656,00*	6.6%

* Na btw-teruggave
Deze verdient u binnen 9,4 jaar terug

TOENAME WOONCOMFORT
★★★★☆

U werkt met dit zonnestroomsysteem jaarlijks 3070 kWh op. Dit levert met een elektriciteitsprijs van €0,23/kWh een jaarlijkse besparing op van €710.

Uw huidige maandbedrag van €239 wordt met deze installatie ruim 25% lager, voor een nieuw maandbedrag van €180. Dat zorgt ervoor dat je de investering in 9,4 jaar terugverdiend.

Bovendien vermindert u uw CO₂-uitsoot met 1,74 ton CO₂ per jaar. Dat staat gelijk aan 13 keer naar Parijs vliegen, 556 liter diesel verbranden of 27840 km met de trein reizen. Een mooie bijdrage aan een groenere toekomst dus!

Hieronder ziet u wat de installatie met het energielabel van uw woning doet. Een woning met een beter energielabel verkoopt sneller en voor meer dan een soortgelijke woning met een slecht label, dus dat is mooi meegenomen!

U bent er bijna!
Deze offerte is specifiek voor uw situatie opgesteld door onze experts. Geeft u akkoord, dan zorgen wij voor een hoogwaardige installatie door een betrouwbare partij. Zo kunt u zorgeloos genieten van een duurzame en comfortabele woning.

MARK ZAAL
UW PERSOONLIJK ADVISEUR

ENERGIELABEL

A B C D E F G

NIEUW: C | HUIDIG: E

PRUISOPBOUW

Product	Aantal	BTW	Subtotaal
16 full-black Winaico hoogrendementspanelen van 300Wp inclusief SMA omvormer...	1	21%	€ 6656,00
	Totaal excl. BTW		€ 6656,00
	BTW 21%		€ 1397,76
	Totaal incl. BTW		€ 8053,76

BELANGRIJKE INFORMATIE

- FINANCIERING EN SUBSIDIES +
- GELDIGHEID VAN DE OFFERTE +
- GARANTIES +
- MONTAGE EN COÖRDINATIE +
- DENKT U OOK HIERAAN +

Mocht u omtrent de verstrekte informatie of anderszins vragen hebben, dan verzoeken wij u vriendelijk contact op te nemen via telefoonnummer 085 210 3977. Er kunnen geen rechten worden ontleend aan eventuele typfouten in onze offerte.

Offerte verloopt over 14 dagen

WORD OOK ENERGIEBESPAARDER EN GA AKKOORD

A Personalised offer

B Removed warning sign

C Expert showing trust

D Activating next click

Figure 24 - The re-design of the offer-page designed by the product developer after the tool use session

5.2 TESTING THE TOOL WITH PRODUCT DEVELOPERS

TOOL TEST SET-UP

In the research approach I've talked about the set-up of the user test, I've described the tool requirements and I've discussed findings from the start-up interviews. In this sub-chapter I will recap both and then provide a summary of the tool tests in general. The last part of the chapter is dedicated to discussing some of the results and comprising them into important tips and top.

AIM OF THE TOOL TEST

The goal of the tool itself was: 'to bring the product developers a tool that increases their understanding of the ways to influence sustainable behaviour, structures a plethora of theory collected to offer insights in how to more effectively frame their message to provoke consumer behaviour change'. To determine whether this goal is achieved, or to what extent, a tool test is set up. The goal of the tool test is to test to what extent the tool's content and design are understood, and how easy the product developers can work with the tool. More specifically, the test should not only show to what extent the requirements are met, but also help to answer the research question that stated:

How can behaviour change models, environmental behaviour barriers, and influence mechanisms be integrated into a tool that offers start-ups insights into message framing for sustainability?

REQUIREMENTS

To measure whether the design tool reaches its goal, I've determined several requirements. A recurring thing in this thesis is the jumping

back and forth between theory and practice. This concept does not only show in the process, but is also a central concept in the tool. In the tool this will help in determining the expected best balance between accuracy (theory) and workability (practice). This is achieved by changing the solution according to the outcomes of each iteration and then switching back to the other to seek for validation. By moving back and forth and slowly changing to find a middle point that is acceptable for both theory and practice can be achieved. Although there is no absolute solution, it does provide the best possible way for me to achieve this without making assumptions of what could work best. This way I try to keep my opinion out of the process as much as possible. According to Michie et al (2011) a good framework for interventions design should have four characteristics that I will adopt as basic criteria for my tool. The general criteria for developing a design tool have been described in the research methodology in, but with the theory being collected I can specify on further requirements, which are described below.

Accuracy requirements

1. The content of the tool must link to overarching behavioural models and be coherent and consistent to theory.
2. The content should provide sufficient information to explain the basics of behaviour change for sustainable behaviour.

Workability requirements

3. The content of the tool should be sufficiently narrowed to prevent complexity

and to keep the product developer interested in the tool.

4. All the terms used in the tool must be understandable by people who are unfamiliar with the topic and be able to be used intuitively.
5. The tool contains practical influence mechanisms that can directly be implemented, and inspire the product developer to apply the tool content and design tweaks to their own situation.

Design requirements

6. The tool must be aesthetically pleasing, or attract attention by its appearance in a positive way.
7. The design of the different elements must contribute to an intuitive process of following the steps in the tool.

Tool test session structure

The tool test will be performed in individual sessions with product developers from different start-ups. Each test will take about 1.5 hours and is accompanied by the steps presented below. The steps that will be taken are as follows:

1. Prior to the test session give a general introduction of the tool and the session. To get to know the current knowledge base and starting point of the tool usage offer two questions that the product developer already has to think about:
 - a. What type of media output do you want to discuss in the session?
 - b. Who is your consumer, what do you know about them and what specific behaviour do you want to see?
2. Start the session by having the product developer read the tool description that is accompanied by the tool (see Appendix X and XI) and have them answer the two questions in details and ask them to elaborate out loud. Participants should be instructed to speak their mind during the session, ask question and state what they do and experience.
3. Let the product developers use the tool without interfering. If they have questions, answer the questions, and otherwise

observe what they do and how they react.

4. After having given the product developers a chance to use the tool themselves, restart the tool use process, but this time together. Walk through each element and discuss the determinants up until the design tweaks.
5. End the session by asking for an evaluation of the tool, the process and any difficulties the product developer experienced.

PARTICIPANTS AND PRIOR INTERVIEWS

As described the tool will be tested at 6 different start-ups¹ with their product developers (see Chapter 2.1 for the start-up selection criteria and Appendix IV for the selected start-ups). From the interviews described earlier in the report the following conclusions were drawn. Below a recap of all the prior findings of the preliminary interviews held:

- The start-ups are very invested in their product and rely mostly on their own opinion.
- Most start-ups know who they want their consumer to be, know some of their demographic characteristics, but lack knowledge about their values and how they can be addressed.
- The start-ups base their content design on gut feelings and focus more on aesthetics than effective design to influence behaviour.
- The start-ups have little knowledge about social psychology and how to use influence mechanisms.
- The start-ups are interested in knowing how to approach consumers more effectively.
- The start-ups feel like they have little time to dig into new topics and start learning, but they are interested in learning fast effective tweaks.

¹ De Energiebespaarders, Seepje, KarTent, The Bamboo Brush Society, Supersola, and Yoni

5.3 PRESENTING THE RESULTS

OUTCOMES TOOL TEST

The tool is the result of a first exploration into the practical integration of behaviour change models, pro-environmental behaviour, and user experience design. Although a wide range of literature is available, it shows there is not one path to behaviour change. The general aim of the tool test is to find out whether, with the current theoretical content and design, the tool is understandable and workable for the product developers. I will analyse the tests to determine to what extent the tool fulfils its requirements and where the product developers experience difficulty in using the tool, or parts of the tool.

The results are presented in three parts. Each tool test was recorded and summarized. The first part describes the main observations that occurred on regular basis or during several tool tests. Following the observations are two tables showing an overview of the positive remarks and negative remarks mentioned by the product developers. The third part of the tool test analysis describes whether the tool reaches its aims as described in the requirements. In that sub-chapter all the requirements are elaborated upon, supported by quotes from the interviews, and a description of the main experiences during the tests.

POSITIVE AND NEGATIVE FEATURES EXPERIENCED

Table 10 and Table 11 present positive and negative features mentioned by product developers throughout the tool test sessions. Only the features that were mentioned more than three times are listed in the tables, because I consider them sufficiently relevant to consider in the evaluation. In a further iteration, additional less mentioned remarks could also be taken into consideration, but at this stage of the research I only focus on those mentioned by at least half product developers in the total of six test sessions.

Tool test observation

The observations described below are personal observations collected during the tool tests. Some observations are more generalized, others are more specific, and when relevant the number tool tests where the observation is occurred is shown in between brackets.

The content

- The barriers from the construct efficacy are rarely chosen (1/6)
- The most chosen barriers are: limited cognition (5/6), motivation (4/6), scepticism (6/6), social opinion (4/5), and mistrust (5/6)
- Some product developers chose two barriers (4/6), others chose three (2/6)
- The most talked about influence mechanisms were: value targeting (6/6), storytelling (4/6), social comparison (4/6), self-persuasion (3/6) and role-model and authority (4/6)
- The product developers find it difficult to identify the main barriers at first because they have not thought about them before (5/6), but when looking at the tool poster, they manage to choose which they think are most relevant to them easily (6/6)

The session

- A session of 1.5 hours is enough to reach the influence mechanisms step, but not enough to use the design tweaks to frame a message. This should be done in a longer session or in a follow up session (5/6)
- The more explanation the product developers get, the more they are interested in knowing more start asking questions
- It is difficult for the product developers to directly convert the tactics of the influence mechanisms into a design for their own product/service (5/6)
- The product developers are most keen to have the terms explained to them (6/6),

but point out determinants on the poster regularly to confirm their understanding (4/6)

The product developers

- The current knowledge about social psychology is low, most terms and concept are new to the product developers
- Some product developers have trouble in letting go of their ideas and opening up to new insights (2/6)
- Most product developers like to be told what to do, rather than to learn theory (5/6)
- The product developers are interested to hear more about influence mechanism (6/6)
- The product developers stay focussed and interested throughout the session (6/6)
- The body language of the product developers is open and interested (5/6)
- The product developers want to share the information with their colleagues (4/6)
- The product developer find it a lot of information that is new and need some time to understand each determinant (4/6)

POSITIVE AND NEGATIVE REMARKS DURING THE TOOL TEST

The coding to obtain these tables was done through rough coding, where I did not seek word by word reproduction of the sentences stated in the table, but for a formulated that contained the same message. Through the tool tests I was seeking for the level of understanding and the necessary changes that could improve the workability of the tool. I therefore decided not to focus on the exact wording, but rather the meaning of what the product developers said or did. Whether something is easy or not is very subjective. However, to me the most important is that the product developers find it easy enough, not what they mean with easy. The workability of the tool is about their experience of the usage, not a factual value on what workability is. In seeking for remarks, I see value in the negative remarks because they can take the re-design to the next level in a better way than reinforcing the positive remarks.

Positive remarks

Table 10 shows the positive remarks on the tool. What is most apparent is the enthusiastic opinion towards the looks of the tool, the general content that the tool is suggested to provide, and the discourse on the content.

The product developers are attracted to the tool because of the colours and the barrier images that support the overall structure. All product developers are very interested to hear about the content in both elaboration on what they see in the tool as well as a conversation about possible usage of influence mechanisms for their specific product. They seem to find most support in the tool tests when talking with the moderator, but they value the poster greatly to have something to look at and refer to.

Negative remarks

Rather than focussing on the positive remarks, it is very worthwhile to put more emphasis in analysing the tool test according to the negative remarks. Negative feedback or critiques can provide stronger incentives to change the tool and improve acceptance. When looking at the remarks in Table 11, the most apparent critique is about the level of difficulty in terms of expectation management, understanding the terms and applying the content to their personal situation.

All product developers state they find it difficult to begin using the tool and to know where it will take them. The level of knowledge on the topic is low, and most information is new to the product developers. Without the moderator's help, they are afraid to make decisions. The tool offers to little guidance on what is the right next step for them to proceed individually. More tactics in the booklet could provide better practical steps, just as real life examples. The majority of the critique points all address the difficulty of the content. So although the theory is already narrowed down for ease of understanding, the current knowledge base of the product developer is low. The tool seems to give good visual support, but personal guidance is still necessary to make the content of the tool workable and comprehensive.

Table 10 - Positive outcomes of the tool test

Positive features of the tool	Number of mentions
Overall impression poster	
The tool looks attractive and draws your attention	5
The tool has potential to give new insights	6
Overall impression booklet	
The booklet gives good support and a lot of new information	4
It looks well designed	4
Tool guides	
The poster lines are intuitive	5
In conversation it is really nice to have the tool as visual back-up	6
Barriers	
Easy to associate the barriers to the consumers	5
The images are a nice contribution	4
It's very nice to approach is from a barrier perspective for a change	3
Influence mechanisms	
The influence mechanisms give new insights	6
The influence mechanisms offer refreshing ways to overcome barrier with	4
The enthusiasm to apply this in personal situation is awakened	5
Design tweaks	
The design tweaks can be nice to know to know how to design	4
As follow-up session would be nice to make the designs	3
Tool usage	
Being taken through the process step-wise is helpful	6
The participant wants to share the tool with colleagues	3
The participant wants to have the tool for later use	6

Table 11 - Negative outcomes of the tool test

Critique on the tool	Number of mentions
Overall impression poster	
The tool has a high level of complexity, it looks like a lot	5
The colour in the tool are too bright	3
Overall impression booklet	
The design is not always as clear as the poster in giving direction	4
The order of the content could be improved	3
Tool guides	
It is difficult to know what can be expected up front	5
It is hard to determine if you've made the right decision	3
It is difficult to directly use the insights for own product/service	3
The tool guides in the booklet are not clear for everything	3
Barriers	
It is difficult to know what barriers are the right barriers	3
Difficult term: Limited cognition	3
Difficult terms: Perceived control	4
Difficult distinction: Social opinion and Herd behaviour	3
Difficult distinction: Too distant and Perceived control	3
Influence mechanisms	
Showing more success stories is more convincing	3
The tactics should get more attention in the booklet	4
Difficult term: reciprocity	3
Design tweaks	
Some design tweaks are also a tactic which is confusing	3
The numbers are not understood on the poster	4
Flipping between booklet and design tweaks is inconvenient	4
Tool usage	
Without online access the tool would be used less	3
The tool is difficult to use for an inexperienced user	6

REQUIREMENT FULFILMENT

I've shortly elaborated on the critique points of the tool tests. What appeared was that the current knowledge base of the product developers is lower than expected, and their need for personal guidance is high. The goal of the tool was that it uses a high level of theoretical content, but also stays workable for laypeople. As the critiques of the tool test show, using the tool is still difficult in its current form, but the tool does offer good guidance during discourse. To determine how workable the tool is I will evaluate the tool tests according to the requirements. For each requirement I will explain when it is fulfilled and how I measured it. In the sub-chapter 5.4, I will propose several improvements obtained from the test results. These will also return in the discussion in Part 4 of this thesis.

In the analysis of the tool tests, I've only focussed on the evaluation of the product developers from the start-ups. Although some of the requirements discuss the theoretical base of this study and concern the experts input, I do not evaluate on their terms. What I have tried to do, is the use the expert input during Step 1 and Step 2 of the process, and did not test the tool with them in Step 3. Therefore, I will not discuss the expert opinions in this part of the tool test requirement assessment, but rather combine the evaluation of the product developers and the expert opinions responsible for the content selection of the tool in the discussion in Chapters 6.1 and 6.2.

Accuracy requirements

1. *The content of the tool must link to overarching behavioural models and should be coherent and consistent to theory.*

This requirement is achieved if the tool contains the three constructs that literature described as important in behaviour change. These constructs were based on the Theory of Planned Behaviour (Ajzen, 1991) and Dual System thinking (Kahneman, 2011) and included attitude, social norm and efficacy. Secondly the tool should be verified by at least on expert to be accepted

on theoretical basis, but the content should supported by more expert and literature throughout the multiple iterations.

Reflection: The basic structure of the tool is based on the three constructs, with a small alteration of efficacy. The arrangement of the constructs and the links to the barriers were discussed with three experts (Geiger, 2018, personal interview; Slob, 2018, personal interview; Visser, 2018). Both agreed that starting the constructs based on the TPB gives the tool a strong foundation that is easily understandable for laypeople. If they are unfamiliar with the topic, it is sufficient to provide them basic information, rather than include them in the contradicting findings on human behaviour. Slob (2018) stated that it is difficult to validate all the choices made for the connections in the tool because behaviour is dependent on many factors, so more research is needed to be more sure, but for the current available knowledge this tool is a good starting point from a theoretical point of view. As stated in the reflection of the critique remarks, the tool as it is, is already quite difficult and dense in content. So, going into depth on more theory is useful from an expert point of view (Onwezen, 2018), but it is better to put focus on a simple structure such as TPB when talking to the product developers. During the tool test one product developer said that "perhaps the tool can put even more focus on the constructs because it helps me put behaviour into context" (Smith, 2018, Supersola). So, I think this requirement is achieved, but further research could on simplifying findings in social psychology for sustainable behaviour could strengthen the decisions.

2. *The content should provide sufficient information to explain the basics of behaviour change for sustainable behaviour.*

This requirement is fulfilled if all the product developers understand the structure of the tool and the individual elements. The product developers may also refer to the

accompanying booklet if they wish to have additional information about specific elements. At the end of the session they should understand the basic principles of behaviour and be able to place the behaviour of their consumers into context.

Reflection: In the personal interviews most experts agree that this information is a lot to process. They are uneducated on the mechanisms, so presenting more would overcomplicate the information presented (Geiger, 2018; Lingsma, 2018; Melchior, 2018; Onwezen, 2018; Slob, 2018; van der Werf, 2018; Visser, 2011). All product developers agreed that the tool covers a lot of content, but that is difficult to understand them at first sight and by themselves. This is solved if they are guided through the tool through discourse and engagement. As such, they find it much easier to understand and feel confident in meanings of the elements of the tool. "With this tool I can directly test ideas I have about how to design a message, and check whether I'm right or whether I need to take a step back and rethink my choice" (van Iersel, 2018, Bolt Mobility). Some product developers are keen on reading the accompanying information in the booklet (Roode, 2018; Smith, 2018; van Beek, 2018b; van Bruinessen, 2018). One said "the influence mechanisms are the most interesting to me and I would like to read more about them"(van Beek, 2018, De Energiebespaarders). Others are uninterested in reading and rather get taken through the process verbally and be explained the influence mechanisms through examples (Nefkens, 2018; Portheijne & van Eeden, 2018; Tripp, 2018). Rather than providing sufficient information some product developers mentioned that it feels like too much information (Nefkens, 2018; Portheijne, 2018; Roode, 2018; Smith, 2018), and that they feel insecure in choosing from the many barriers (Nefkens, 2018; Roode, 2018; Smith, 2018; van Bruinessen, 2018). So, the requirement is met, but a big critique is still that in current form it still feels like too much information and too many choices.

Workability requirements

3. *The content of the tool should be sufficiently narrowed to prevent complexity and to keep the product developer interested in the tool.*

This requirement is fulfilled if the participants are comfortable with the amount of information presented and the structure of the tool. An indicator of a too high complexity is when the product developers refrain from interacting with the tool or lose focus. If the participants are still interested to use tool after the test, or at a later moment, I for now assume that their interest can be considered high.

Reflection: A good indicator that the tool offers new insights that the product developers feel connected to the discussed content at the end of each tool test. All but one product developer asked if they could keep the tool or get a digital version. "I want to learn the information and be able to refer back to the booklet and poster whenever I am developing a marketing message" (Roode, 2018, Seepje) One product developer disagreed in saying that "for me it is too much reading and too complex. It doesn't give me quick enough answers and don't think I will ever look at it again. Especially not when it is only in paper form" (Nefkens, 2018, The Bamboo Brush Society)

Another product developer also sees value in the tool and using it more than once. "I see the value of this tool right away, because I think it is valuable to have a tool as reference point when thinking about communicating a message. That is not something everybody can do intuitively" (van Iersel, 2018, Bolt Mobility). However, he does state that it will first take him some time to understand the tool fully. If this would be made easier, more people might want to use it. Three product developers explicitly state that they would want to have the tool online. This, to always have access to it (Portheijne & van Eeden, 2018), and to decrease complexity in being able to select a barrier and have the other barriers fall

away (Nefkens, 2018; Smith, 2018). However, all participants stay very focused during the engagement stage of the tool test, and during talking they often look back at the tool to point out something or check if they understand it correctly. This indicated that during the conversation, the tool offers visual support strengthening the understanding. Two product developers also explicitly mention this (Smith, 2018; van Bruinessen, 2018). Three product developers do say they get a little bit lost during the process and would not be able to stay focused without personal guidance (Roode, 2018; Smith, 2018; van Bruinessen, 2018). "Perhaps you should use more of the elements in your tool to improve your tool, because it is too complex for me to change my behaviour on how I design my messages, something I do want to change" (Portheijne, 2018, KarTent). In general I think this requirement is only partially met. The structure of the tool is sufficient, and the content of the terms also, but using the tool is still difficult due to the many determinants presented in each element step.

4. *All the terms used in the tool must be understandable by people who are unfamiliar with the topic and be able to be used intuitively.*

Throughout the iterations of the tool development I've tried to prevent complex terms from appearing in the tool by introducing them to the focus group participants. An indication of a misunderstanding occurs if they ask what something means or if they talk about a determinant of any element in an incorrect way. Additionally, I see this requirement as fulfilled when the product developer understands the link from one element to the next and understands how the design tweak applies to influence mechanism.

Reflection: Most product developers were unsure to start using the tool straight away by themselves and needed my help to start. "When you start it is difficult to know what the tool is for and what you can expect to

get as outcome" (Roode, 2018, Seepje). However, the only start they needed was the question to determine what barrier could be experienced by their target group. Only for some choosing the right barriers was difficult (Smith, 2018), others were more interested to hear my opinion because they expected me to know the answer (Nefkens, 2018; Portheijne & van Eeden, 2018). Two would like to see more success stories because that would be more convincing than explanations (Nefkens, 2018; Roode, 2018; van Iersel, 2018).

Throughout the test session there were still several terms that caused some confusion. These terms included limited cognition (1 mention), attention points (2 mentions), reciprocity (2 mentions), too distant (1 mention), perceived control (3 mention), autonomy (1 mention). Others found it difficult to distinguish social opinion from herd behaviour (2 mentions), and between perceived control and too distant (2 mentions). All the product developers seemed to be comfortable to work in English. One specifically mentioned to "definitely keep the tool in English, because English is much more nuanced. You can express yourself better in English than in Dutch" (van Beek, 2018, De Energiebespaarders).

Overall, I think this requirement is met to a sufficient extent, however, the big struggle is the amount of barriers that make it harder to distinguish between them and then move on to the many influence mechanisms. The connection between the elements seemed well understood, as nobody mentioned experiencing difficulty with proceeding to the next step.

5. *The tool contains practical influence mechanisms that can directly be implemented, and inspire the product developer to apply the tool content and design tweaks to their own situation.*

If all the participants engage in the tool test and reflect the information presented on their own situation by coming up with

suitable examples I will consider this requirement to be fulfilled. An example is assessed as suitable if it matches what I intended to achieve with the explanation of a determinant.

Reflection: "We have ideas about what we want, but the question remains on how to achieve it. This tool really offer support and techniques that help a lot" (Roode, 2018, Seepje). In each tool test the product developers reflected with examples on their own situation and asked whether they understood the information by giving examples from their own experience. Some misunderstood how to use the influence. An example was that the focus of the product developers was still too much on the deficit model, which he could not let go. "So, if I use storytelling, I should explain why the product works and that is sustainable and good for the environment" (Nefkens, 2018, The Bamboo Brush Society). This indicated that they tried to make the information their own, which is a positive effect, but can be improved if they understand it even better. By using active words the product developers feel triggered to think about applying the mechanism or design tweak to their own situation directly when reading it (Roode, 2018; van Beek, 2018b). "There are so many usable things in this that technically oriented companies could use very well" (Smith, 2018, Supersola). One mentioned that he got really excited during the conversation and was keen on sharing the information with his team to develop his marketing, and during the tool test he was constantly brainstorming how to apply this in his situation (Smith, 2018).

A critique on the tool tests was that it took long to walk through the barriers and influence mechanisms. We could not always get through the design tweaks sufficiently. This could be because of the knowledge deficit of the product developers, but also because of the little attention the design tweaks get in the tool and the booklet. How to incorporate the design tweaks better requires additional research and testing.

One product developer said the understood the tool, but in our conversation, he seemed to stick to conventional methods to design a message and did not seem to understand how to use the tool for his own purpose (Nefkens, 2018).

In general I think this requirement is met sufficiently due to the enthusiasm that the product developers applied in the session. Several made notes for themselves during the session that they wanted to take with them in their further work (Roode, 2018; Smith, 2018; van Beek, 2018; van Bruinessen, 2018; van Eeden, 2018).

Design requirements

6. *The tool must be aesthetically pleasing.*

Since aesthetics is a very subjective concept, driven by personal preference and opinion, it is difficult to assess whether this requirement is met. However, I have added this requirement because it is important that the tool attracts attention and interests potential users. Therefore, in assessing this requirement I will take notice of primary reactions to the tools appearance, and ask for their opinion afterwards. If I hear positive reactions and get positive feedback I consider this tool to be sufficiently fulfilled.

Reflection: The product developers responded well to the colourful appearance of the tool, which directly drew their attention, by giving a compliment right when seeing the tool (Portheijne & van Eeden, 2018; Roode, 2018; Smith, 2018; van Bruinessen, 2018) One advised that the tool would be more attractive to him if three main colours were chosen for the constructs and if the barriers would then be that same colour but a different saturation, followed by a influence mechanism in an even lighter colour (van Beek, 2018b). Others were more enthusiastic. "I would want to hang it as a poster above to everybody their desk" (van Iersel, 2018, Bolt Mobility). At the end of the tool test all product developers agreed that the tool looks clear (4 mentions), the design is attractive (5 mentions), and does not take away attention from the information

(3 mentions), but that the colour could be a little less bright (2 mentions). The main critique that also reappeared in asking about the aesthetics is the large amount of barriers that make the tool look difficult at first sight. Some product developer stated that the way they are visualized and given colour does not fully help to overcome this first impression (Portheijne, 2018; van Beek, 2018).

In general I think the tool is well on its way of fulfilling this requirement. The general design elements are found to be aesthetically, but the primary necessity is to narrow down the content of the tool. If that is done, then the aesthetics serve its purpose better.

7. The design of the different segments must contribute to an intuitive process of following the steps in the tool.

Similar to the last requirement, this is difficult to measure. To measure the fulfilment of this requirement I will assess if the use-cues put in the design result in the desired action, if design choices that were not intended to also behave use-cues and if the right elements are sufficiently highlighted to attract the right attention. As an example, the constructs should not attract attention, the barriers per construct should appear to belong together, the lines coming out of the barriers should function as arrows pointing the way to the influence mechanisms, the design tweaks placed in circles should not indicate as a follow-up but as single standing example without a ranking order, the gray bar with the barriers should attract sufficient attention to explain the elements, and the steps from element to element should be addressed the same in the booklet as it is on the poster. If the intended use-cues are picked up then I see this requirement as fulfilled. I assume a use-cue is picked up if the product developer proceeds to the next step without asking my for guidance, or when they verbally walk through the tool and explain what they are doing according to what was intended. If

they ask what to do next, I assume a use-cue is not picked up sufficiently.

Reflection: The use-cues that were generally picked up by all product developers that the barriers were divided in three groups and that each barrier had two influence mechanism, that the colours in the booklet were the same as the poster colours, and that the booklet gave extra information, but the structure was not always understood. Moving from each element to the next seemed to be understood. "The tool looks great, and although it is a lot, once you get through it and understand the flow of the elements explained in grey you see the value of every element. The flow of the design helps with understanding these steps" (Smith, 2018, Supersola). Although the flow seems to work intuitively, none of the product developers had noticed the title bar with the element titles. One mentioned that he would have wanted something to show him that the barrier element requires a choice, and that the influence mechanism and design tweaks provide and answer (van Bruinessen, 2018). Another product developer indicated that the design tweaks seem consecutive and do not intuitively guide him towards the booklet (van Beek, 2018, De Energiebespaarders). The use-cues on the poster seemed to be more effective than in the booklet. I was asked twice how the page layout worked (Nefkens, 2018; Smith, 2018). Another product developer provided and answer for this by suggesting that "the arrows work indicative, but they don't have the same use-cues as the direction in the booklet. If this would be similar it would be stronger in design" (van Beek, 2018, De Energiebespaarders).

I consider this last design requirement to be partially fulfilled, but not fully yet. Again, this is because a lot of information is new and understanding all use-cues at the first try is difficult. However, when discussed, all the product developers found is very easy to work with the structure of the tool making the requirement more fulfilled.

5.4 SUGGESTED IMPROVEMENTS

I've chosen to suggest one improvement for each requirement. This will result in seven improvements to further develop the tool. The tool test recordings and the results provide more depth on possible solutions of the exact problems, so in this sub-chapter I will only give a short explanation of the improvements.

ACCURACY

Although the tool is a comprised version literature available on behaviour change for sustainability, the theory is still complex and a lot process for an inexperienced product developer. The improvements suggested below aim to offer context and expectations of the user, in order to keep the level of theory.

1. Context

If the theory is placed in a context that explains the basic behaviour change constructs more and elaborates on what the product developers can expect from using the tool, it can increase product developers their understanding. Therefore, I propose to elaborate on the context setting of the tool. By giving the constructs, the elements and the flow of the tool a short explanation product developer will find it easier to understand what to do. This can both be done through information provision, but also through expanding the tool poster by making the constructs and flow more salient. The connection from tool to barrier, and from barriers to influence mechanism, which are accompanied by suggested design tweaks can be made more salient and activating words in the grey bar could stimulate the steps that need to be taken to use the tool.

2. Booklet

The product developers stated that the tool is most effective if it is used in a collaborative session. During the tests, when the booklet were consulted, it showed that the order of information can be improved. If the tactics would get more attention product developers

intuitively understand their need to focus them. Furthermore, each influence mechanism now shows the design tweaks in numbers, followed by an example. A better solution would be to first show an example and then add the design tweaks that were used in that example in words. Preferably this should be examples with a sustainable background, but more research is needed to find the right examples. This would make the information easier, and directly give an idea of how to implement the design tweaks without having to switch to different pages.

WORKABILITY

The best improvement would be if the tool would stand more on its own and rely less on an experienced moderator. So, I've selected three improvement suggestions that improve the workability of the tool and make it appear less complex.

3. Complexity

To prevent the product developer from being overwhelmed by the content of the tool and resulting in an insecurity to start using the tool, the complexity needs to decrease. Product developers showed most interest in the influence mechanisms. The barriers were a good first step to make a decision, but there were a lot of barriers for them to process, some seeming similar to their perception. After having chosen a barrier they wanted to know more about influence mechanism connected to other barriers. A solution to make the first step easier and decrease the uncertainty in choosing the right barriers, is to narrow down the number of barriers. For this, I suggest narrowing down to a maximum of six an connecting more influence mechanisms to each barrier. This way, a first step in the tool usage has been made, increasing the change of them continuing with the tool will increase. Similarly, for each barrier there can then be more influence mechanisms which feed the product developers with more information, but because

they have made the first step already, it is easier for them to process more information later. The focus of the tool will then also lie more at the influence mechanism. Decreasing the amount of barriers will make product developers more autonomous because the first choice is easier, opening them to learn about the influence mechanisms. However, I do want to state that before narrowing down the barriers, iterations back to expert opinions and literature are needed again to keep the theoretical validity of the tool. Thus, more research is required here.

4. Decision making

To prevent misunderstandings, I would suggest to again contemplate a focus group and discuss the terms that were found to be difficult in the test again to prevent any discrepancy between terms. I would suggest to also walk through the booklet and check for any difficult tactics and possible ways to shorten some explanation. The fewer text is necessary the easier the tool and booklet will be to use for users. If the terms are better understood it is easier for product developer to decide between one or the other.

Building upon this is the process of decision making. Because at some point during the test each product developer experienced difficulty in making a confident decision. Making the process guides more salient and improving the terms for easier understanding provided a better infrastructure for decision making. However, perhaps more research on decision making could be consulted. By incorporating how to support decision making in complex situation and applying this knowledge in the tool can improve the workability of the tool. So, for this, further research is needed if further iterations will be made.

5. Online access

In order to give product developers the best access to the tool, I would recommend the tool to also be available online. There are two advantages to online access. The first is, that everybody can easily refer to the tool anytime and anywhere, which increases the chance of people using it. Furthermore, the complexity problem can also be solved because it can be designed in a way

that determinants that are not chosen can fall away. Also, the tool can be more dynamic and personalized. When product developer wishes to see more examples, they can be added. When they want to skip a step that is also possible. Thus, in further development, offering an online version of the tool created many new opportunities to improve personalized assistance and therefore makes the tool more dynamic. Focusing on an online version of the tool to increase its accessibility will also influence the learning curve of the tool. This learning curve will be discussed in Chapter 6.2.

DESIGN

In order to make the design add more to the intuitive workability of the tool, I propose two design improvements that both help the tool developers use the tool as well as improve the aesthetics of the tool.

6. Colour

Although using many colours attracts attention, the tool is already complex to digest. An improvement to decrease complexity through design is to narrow down the colours to three main colour groups, one per construct. The barriers that are then connected to the construct should have the same colour but with a different saturation and the influence mechanisms can then be the same colour but changed in contrast. A further recommendation is to use softer colours. Brighter colour can then be used to make indicators that show the flow of the tool usage more salient.

7. Flow of use-cues

The final recommendation is to focus more on design consistency between the tool poster and the booklet. On the tool poster the use-cue from barrier to influence mechanism is that it expands into two new rectangles with a dark section creating dimension followed by two white arrows. This same style should be used in the booklet. Also, the top of the tool poster introducing the elements can be more salient to guide the product developer during the process. Because of the complexity of the tool, the design of the tool poster and the booklet should take the product developer by the hand.

6. Evaluation



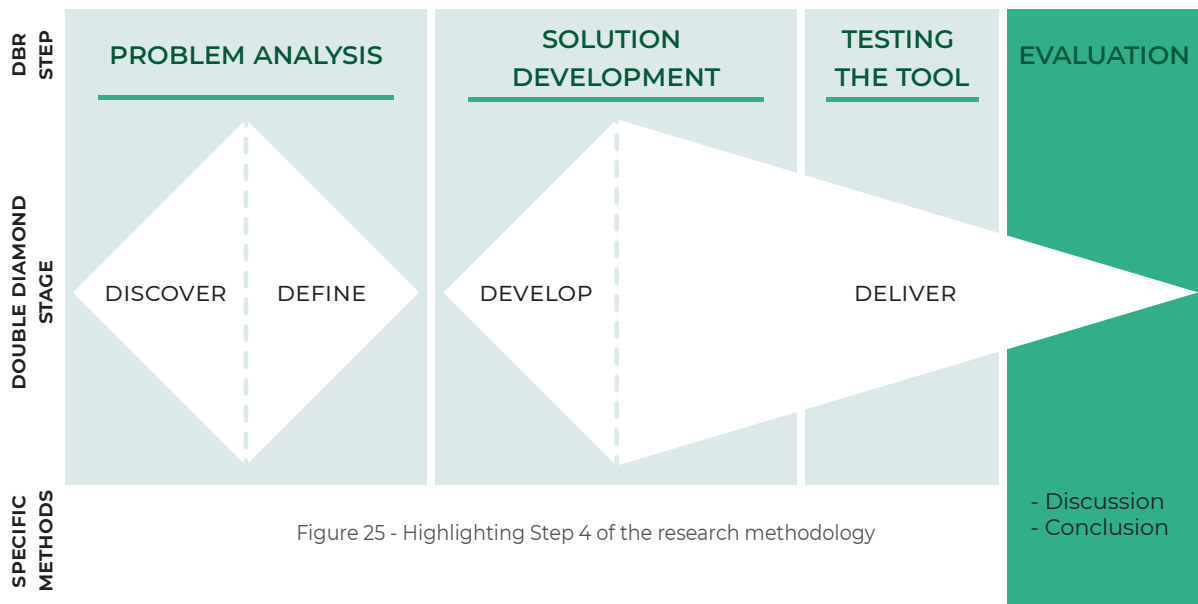


Figure 25 - Highlighting Step 4 of the research methodology

"Good education teaches us to be a little less arrogant, to realize that much of what we think in certain is in fact wrong and delusional, to critique ourselves and not just the world around us. The key is to say humble, to keep questioning and to keep studying our subject, because we must not be afraid of change"

— David Fosters (Micklem, 2017, para. 21)

PART 4: EVALUATION

Up until this point, I've developed and tested a tool kit to give product developers insights in how to frame their external messages to overcome sustainable behaviour barriers and change their consumer behaviour. Part 3 ended with design recommendations for further tool development. The last Step of the DBR approach includes the presentation of the practical outcomes of the tool (see Figure 25), in my case the final tool, which can be found in Appendix X and Appendix XI for the booklet. Secondly, the Step 4 of the DBR approach also includes a contribution to theory, which is also presented in this part, being accompanied by recommendation for future research. To finalize the last conversion of the Double Diamond, I will reflect upon the tool kit by answering the research questions in the conclusion.

HOW TO READ CHAPTER 6

In Part 4 of this thesis I will discuss the tool, the findings of the tool test, and evaluate the process of this research. I will divide this chapter into three parts, that build further on each other and finally present room for further research according to my findings and my personal experience.

6.1 Conclusion

6.2 Discussion

6.3 Recommendations

This will be done in the discussion chapter. I will then draw conclusion on this discussion and present them in a separate chapter, where I will also answer the research questions given the outcomes of this study. After this I will present recommendations for further research and end this thesis with a personal reflection.

6.1 CONCLUSION

THE SCOPE OF THE RESEARCH

I started this thesis by addressing the desire of the Dutch government to comply to the climate goals by stimulating bottom-up development and relying on industry to power the transition (Ploumen & Kamp, 2013). It is the companies that take this responsibility, have a strong pro-environmental drive, and can develop products or services that favour a sustainable future that should get a chance to lead the way (Kamp & Mansveld, 2013). It's not only a matter of improving the technology of their product, but solving the socio-technical challenge that lies ahead of these businesses (Ministry of Economic Affairs, 2016). This means that we need people to change, but although there is a extensive amount of research on behaviour, the level of applying this knowledge in practice is still limited (Zachrisson & Boks, 2012).

One solution to achieving behaviour change in practice is through message framing. Message framing is the way in which consumers are presented a message to influence their experience and change their behaviour (Chong & Druckman, 2007). However, there is not yet easily accessible literature on knowing how the effectively design a message frame (Zacharisson & Boks, 2012). The problem that I have tried to solve during this study was to find out how to transform currently available literature on behaviour change models into practical steps to address the complexity of the innate inaction and unwillingness of people to change to more sustainable behaviour. This thesis focused on the integration of behaviour change models, environmental behavioural barriers and design for user experience by taking an iterative DBR and Double Diamond approach (see Chapter 2.1). Many iterations between theory (research) and practice (design) helped to develop a tool that supports product developers at sustainable start-ups to gain new insights in how to communicate to their consumers through identifying behavioural

barriers, applying influence mechanisms and framing their message through design. The main research question was formulated:

How can behaviour change models, environmental behaviour barriers, and influence mechanisms be integrated into a tool that offers start-ups insights into message framing for sustainability?

This question was supported by five sub-questions. In the following paragraphs I will answer each sub-question,. Based on these findings I will end this sub-chapter by answering the main question. I will then proceed to the discussion part of this thesis in Chapter 6.2 where I will elaborate on what these findings mean, reflect on the methodology, address the addition of this study to theory and practice. I will end this thesis in Chapter 6.3 where recommendations are presented.

SUB-QUESTIONS

1. *What are the main psychological constructs that make up human behaviour?*

Through an intensive literature review on many behavioural models, ranging from traditional theories to more recent models on pro-environmental behaviour, there were three constructs chosen to make up human behaviour. These constructs are the result of the multiple model analysis and verified by expert interviews to make the final selection for the tool. The constructs are attitude, social norm, and efficacy. Attitude consists of values and beliefs, whilst being steered by knowledge and emotions. Social norms are the set of socially determined acceptable opinions and rules by peer or role models that influence personal norms and help justify behaviour. Efficacy indicates the level of perceived capabilities by the consumers and a person's belief in self-

efficacy and autonomy. As constructs attitude, social norm, and efficacy act as neutral concepts they provide a foundation for the tool.

2. What are the psychological barriers that inhibit changing to more pro-environmental behaviour?

The exploratory literature review and conversations with experts showed many possible barriers inhibiting pro-environmental behaviour. However, for this study, it was decided to focus on a compilation of barriers as defined by Robert Gifford (2011). His 29 dragons of inaction served as foundation to determine the main barriers that cause potential consumers to refrain from making a sustainable purchase. Further literature research and experts input narrowed down, these barriers to nine barriers which were used in the tool: limited cognition, scepticism, motivation, social opinion, herd behaviour, too distant, perceived control, and autonomy. Expert opinions, and an analysis of the influence mechanisms connected the barriers to the main constructs.

3. Which influence mechanisms are identified by both theory and practice that can overcome the identified barriers?

Again, through the exploratory literature review, and by conducting expert interviews, many influence mechanisms were identified. In iterations these were explored, evaluated, discussed and selected. Since there is no one size fits all, and the right influence mechanism is dependent on the specific situation, there was an abundance of mechanisms available. However, as the main goal of the study was to give inexperienced start-ups insights in the basics of behaviour change theories and tools, only a selection of widely applicable and tested influence mechanisms was selected per construct. Otherwise, the selection would offer too much information for start-ups to easily digest with their currently limited knowledge base. The influence mechanisms were connected to the barriers to enable start-ups to follow a step wise approach to improve choosing effective message frame solutions.

Attitude

Limited cognition: storytelling, attention points
Scepticism: tailor-made tracks, value targeting
Motivation: gain vs. loss, emotional steering

Social norm

Social opinion: social comparison, reciprocity
Herd behaviour: personal contact, social commitment
Mistrust: trust, role-model & authority

Efficacy

Too distant: goal setting & feedback, guarantees & free trials
Perceived control: minimum effort & unburden, landscaping
Autonomy: self-persuasion, autonomy

4. How can design tweaks be linked to influence mechanisms to improve message frame design?

Although there are many design tweaks available at different levels of a design process, specific studies on the effect of design tweaks on influence mechanisms is so far limited. There seemed to be no academic proof to justify links between the design tweaks and the influence mechanisms. Nor did I find literature that validate links in design tweaks to any other elements of the tool. Also, experts experienced difficulty in validating links, because the best outcome is too dependent on the situation of a specific behaviour. However, I still wanted to offer product developer tools to design message frames in practicalising the tactics.

So, I am not yet able to fully answer this sub-question, but at this point in the study I can only link the design tweak as examples or suggestion that best match the influence mechanisms. Therefore, I proposed a selection of design tweak in different design categories in the tool that product developer can refer to. They are not absolute, and I do not wish to argue they are by any means true by empirical proof, but they serve a supporting purpose for the product developers' design process. The design tweaks can be found in Appendix IX.

5. *How can the iterative approach of this study contribute to finding a balance in the tool's theoretical accuracy and workability in practice to support inexperienced product developers?*

The iterative nature of the combined approaches in this study have shown how important including both theory and practice is for the development of a workable tool. Literature is very elaborate and experts hesitate to make conclusive selections they can't justify. However, if the results for theory are not downsized, they are too hard to grasp for inexperienced practitioners such as product developers. Throughout this study, I've developed and designed a tool as a first proposal that offers insights in designing messages for more effective consumer behaviour change. Having conducted several start-up tests with the proposed tool has given insights in the workability of the tool. Although the tool offers many new insights to the product developers, they still experience difficulty using the tool individually and need experienced guidance.

My results have shown that for a tool to be workable it needs to be much more simplified than theory suggests. In conversation with experts, narrowing down the theory in the tool does decrease its academic accuracy, but if the main constructs and ideas are in agreement with literature it should be acceptable. The iterative approach is very effective in discovering where alterations need to be made to improve the content and appearance of the tool. By allowing for multiple iterations to occur the tool does not have to be right directly at the beginning, but by constantly switching between two perspectives a better picture of the whole situation is presented from a more distant view. The iterative process can provide a balance that provided a first tool that can allow for further research. Lastly, during this study I also discovered that if the tool is visually well designed, the comprehensibility increased allowing theory to remain dense, so that shows the value of including design in research based studies.

ANSWERING THE RESEARCH QUESTION

Building upon the answers to the sub-questions I can now answer the main research question of my thesis, that stated:

How can behaviour change models, environmental behaviour barriers, and influence mechanisms be integrated into a tool that offers start-ups insights into message framing for sustainability?

To solve this question, I have used a Design Based Research methodology and applied the Double Diamond method to further guide the design process. By incorporating design steps into the process I allowed myself to take a more design perspective for the tool development where necessary to reflect on the theory included and how to make it more workable in practice. To bridge these two approaches I've applied a Design Thinking mentality that enabled me to put more focus on the participants (the product developers) and produce visual support throughout the process leading up to the final proposed tool and tool booklet. Central in this thesis were iterations of switching between theory (research) and practice (design) to obtain a literary accurate but workable tool for product developers at sustainable start-ups. I will answer the question from both a practical and a theoretical perspective.

What I did to answer the research question was to perform a literature research on all the elements described in the research question to build a theoretical framework consisting of selection of determinants for each elements that would be usable in the tool. I then proposed a set of requirements for the tool and started designing a preliminary tool. Through iterations between theory, experts, designers, product developers and a peer group I continuously changed the tool to come to a proposed tool as a design intervention. This tool was tested with product developers and evaluated upon to reflect on the balance between theory and workability, bringing me to this point of the thesis.

The first part of the research question is focussed on an investigation of the main elements that were researched before designing the tool; behaviour change models, environmental behaviour and message design. The behaviour change models lead to the three main behaviour constructs used in the tool and already showed many influence mechanisms. These, and more influence mechanisms were later selected by additional literature reviews and expert interviews. They were then linked to the second part of the research question: the environmental behaviour barriers. Again through iterations, the barriers were narrowed down to be linked to the constructs and the influence mechanisms. Lastly, I've attempted to find literary justification to link design tweaks for message framing to the previous element. Although numerous design tweaks were found and selected, I've so far not been able to validate them on academic ground. However, they are included in the model as examples and as suggestions from message framing. So, from a theoretical perspective, insights in behaviour change theories and their accompanying influence mechanisms are widely available. Through providing a tool that functions as a guide showing connections between the different elements, a preliminary suggestion is made that can help literature to be tested in practice, which brings me to the second part of the research question.

The second part of the research question focuses on how to use the connected elements and put them in a tool for practical purposes through applying design steps of the Double Diamond method and Design Thinking. In the beginning of the report I've argued that the Dutch government belief is that bottom up growth can best solve the climate change problems. Simultaneously, from a systems thinking perspective giving more power to niche innovations can help alter regimes and ultimately the landscape. It is therefore that this thesis is aimed at supporting sustainable start-ups. The second part of the question aims to find a way to transform the found literature into a tool and make it comprehensive and workable for product developers from such start-ups.

So from a practical perspective, this tool offers inexperienced product developers new insights and support in the complex research area of social psychology. This tool offers start-ups a simplified explanation of human behaviour and a step-wise approach to design for behaviour change using mechanisms that focus on unconscious influencing. By being able to iterate between theory and practice, the tool's workability was increased allowing it to accompany start-ups by designing message frames that could potentially evoke more sustainable consumer behaviour change.

Using a combination of DBR and Double Diamond approach stimulated a process of iterations. These iterations explored how to connect knowledge on behaviour (change), sustainable behaviour barriers, influence mechanism, and design tweaks, and reflected upon it with not only behaviour experts but also with product developers from start-ups and experienced designers. So, by making constant iterations between theory (guarding the level of academic accuracy) and practice (making the tool comprehensive for practical use) a tool that offers start-ups insights in influence mechanisms for message design could be developed and makes an initial suggestion for further research, testing and development.

6.2 DISCUSSION

“In order to improve intervention design, we need a systematic method that incorporates an understanding of the nature of behaviour to be changed, and an appropriate system for characterising interventions and their components that can make use of this understanding”

(Michie et al., 2011, p. 2).

RELEVANCE OF THIS STUDY

With this study I've tried to contribute to the integration of social psychology, sustainable behaviour barriers, and user experience design. I've done so by focusing on developing a tool that helps product developers communicate their sustainable product or service through learning how to frame their message. As argued in the beginning of this thesis, by stimulating bottom up innovation to flourish and grow, a drive that is the core business of start-ups, reaching the climate goals can be given extra power. I've proposed a preliminary tool to fill the gap that Michie et al. describe above. This gap was addressed by integrating knowledge from the three research areas to develop a theoretically based tool that is workable in practice.

In this discussion I will reflect on the research methodology and the specific methods, discuss the outcomes of the study to then propose how the results contribute to both literature and practice, from both an Industrial Ecology as well as a Science Communication perspective.

RESEARCH METHODOLOGY

As I have argued, the nature of this thesis had a very practical orientation, aimed to solve message framing deficiencies of product developers. A benefit of using additional Double Diamond method steps to the DBR methods is that it puts focus on the design process by including product developers and design thinking to produce visual tool solutions that aim to support practical use. A tool only designed on theoretical grounds runs the risk

of being limited in its functionality in practice. So, applying an approach such as DBR is very suitable when trying to solve a practical problem whilst building on a theoretical foundation. Another strong feature of the iterative process stimulated by DBR is that it involves continuous testing and reflecting, improving the tool design along the way to best suit its implications. I therefore see value in using a DBR approach rather than a RBD approach because this study has shown the importance and effect of performing a research in a real-world environment, showing new insights and preventing theoretical assumption from taking the upper hand in a proposed design.

However, practice based studies also bring difficulties with them. By choosing to include the practical and design perspective in the process, the study risks losing academic validity due to the information provided by opinionated others. It is difficult to assess the truthfulness of their answers and knowledge. The outcomes of the study are therefore dependent on the practitioners included during the process which can make it difficult to generalize findings. Designing with a Design Thinking mentality is a subjective process and although it can shed light on complex problems from multiple perspective, the outcomes are most likely not the same if the method is to be repeated again. This is something that should be taken into consideration when evaluating the results and using the tool in further practice. A key feature of the DBR approach and Double Diamond approach is that they allow for a mixed method process, which also shows in this study. To

elaborate on the limitations the reliability and validity of my study I will discuss each method.

Exploratory literature review and multiple-model analysis

For the accuracy of the tool it was important that the theory was based on a wide variety of sources. This enables me to identify common grounds, overlapping constructs and recurring principles. By conducting an exploratory literature review I tried to avoid narrowing down too much, integrating multiple views in my analysis. By only relying on theory the validity of the multiple-model analysis increased.

In the selection process I tried to avoid decision making on my personal judgment, running the risk of being influenced by my bias. I did this by consulting experts. One limitation to this method is that each model by itself was already a combination of theories and researches that have been conducted over the last decades. When combining them again and comparing them it was hard to determine whether something occurred frequently because of its importance or whether it was drawn from the same earlier conclusion. Therefore taking a quantitative approach in counting the most important constructs might not have been the best way to decide on the constructs. Fortunately, experts were consulted throughout the process to validate these decisions.

Similarly, because I am not a social psychologist by education, with the knowledge gained after the multiple-model analysis if the study was to be performed again, perhaps I would have chosen a different set of models or analysed them differently due to an increase of my personal knowledge on the area of social psychology.

Expert interviews

As mentioned, the outcomes of some of the elements selected and the acceptance of the level of accuracy was dependent on the input of the experts. As the interviews were semi-structured, it gave the experts a level of freedom to explain their vision and knowledge base. I used a rough coding scheme to determine

the overlap between what experts stated and focused on those terms that were mentioned frequently.

Because semi-structured interviews leave room for uncertainty or for steering by the interviewer, I've tried to reduce the uncertainty by increase the number of interviews. I found it hard to determine the exact saturation point for the number of interview was so therefore I tried to interview as much as possible. Because the number of respondents increased, but the answers remained the same, I considered the results to be more valid, and therefore, also the interviews to be reliable. I want to point out a critique on the selection process of the participants. Although I have tried to select a group of behaviour experts from both commercial and education businesses, as well as varying years of experience, I wish I could have included more long-term experienced experts in the study. Due to busy time schedules and low response rates by renowned experts, I had to include other experts. Regardless, since I interviewed eleven experts in total, and responses were often very similar, I think the results are valid enough for the proposed tool that resulted from my study.

In further research, or if the study was to be performed again, a closer collaboration with multiple research groups and experienced expert on social psychology or behaviour change (for pro-environmental behaviour) could improve the theoretical analysis for the tool development.

Start-up interviews and tool tests

In Chapter 1.1 I explain the decision to build my tool for product developers at sustainable start-ups. With the aim of this thesis being to stimulate sustainable development I chose start-ups that were all involved in sustainability, because the barriers of inaction are fundamentally aimed and pro-environmental inaction. This does not mean that the tool is fundamentally inadequate for non-sustainable start-ups or other businesses. However, I did not test this for other start-ups and did not look at barriers that could occur in situations where

the product or service of the start-up did not concern sustainability. To evaluate whether the tool could also be usable for non-sustainable start-ups or even other types of businesses, I would propose some further iterations and additional research before a conclusion can be drawn.

Because the findings from most interviews presented similar results, I see the semi-structured interviews as sufficiently reliable in that if more start-ups would be interviewed the results would be similar. However, perhaps a more structured feedback set-of questions after the interview could have given additional insights in the experiences of the product developers and given an indication on the effect of the tool and the product developers their behaviour after the tool had time to sink in their brain. In further research this could be added to the process.

I tried to keep the tool test reliable by proposing a clear tool test protocol during each test session. The reactions of the participating product developers were very similar, allowing me to make preliminary assumptions that could answer whether the tool fulfilled its requirements or not. From these assumptions I've generated several design recommendations presented in Chapter 5.4. Although the tool test was set-up to get a preliminary opinion of the product developers on the comprehensiveness and workability of the tool, the results could have been recorded and coded with more precision. This could have increased the accuracy of the results and made the tool test results more reliable. If the test results were to be analysed again by another researcher, perhaps different outcomes would arise due to the interpretation of me as the moderators and a too rough coding scheme. This loose coding scheme also made answering sub-question 5 about finding the right balance between accuracy and workability also difficult to answer.

Focus group sessions

The last method used for the tool development was the focus group. By consisting out of students, rather than experts, the validity of

the output decreases. However, because it was difficult to find a group of design and communication expert willing to consult with me multiple times I decided that a group of students could suffice. Especially, because with the focus group I judged the level of comprehension and tool design. For using the tool no prior knowledge is required, so nor was it for the focus group participants. A convenience sample of students could have therefore been enough. An additional wish was that they either had a design, communication or background in both. This made communication with them easier because of their more openness to design thinking, brainstorming and familiarity with using tools in creative processes.

For the tool development it was beneficial to have design students in the focus group because they are already familiar with the concepts of design tools. However, the selection of participants was still random and for a further research could be moderated better. In that case the sessions could also be recorded and evaluated to get more insight out of the session.

Scoping

One aspect that I've not thoroughly discussed, but has shown importance in the study is the necessity for product developers to know their consumer. Doing pre-research can provide many prior insights necessary to choose the barriers most applicable, the influence mechanisms and the tweak for the specific messages. It is therefore important to always consider that without prior knowledge or a known context the tool will provide less successful outcomes and possibly not influence the right behaviour.

CONTRIBUTION TO THEORY

This research was set out to contribute to improving understanding in how to combine theory on behaviour change, sustainable behaviour barriers and design to develop a workable tool for use in practice by start ups. By dissecting available literature from all the described research areas and seeking to combine and link the separate elements, the following section shows the main contributions.

The tool can only become an effective tool if the connections made between the determinants of each element are tested through empirical research. The tool therefore could be used to help shine light on new research that is needed to justify and discover the relationships between the behaviour barriers and influence mechanisms. Additionally, this study highlights the necessity for more research in the overlap of these research areas, hopefully stimulating more interdisciplinary collaborations for further sustainable behaviour change communication research.

Contribution to Industrial Ecology

Where the field of Industrial Ecology was initially focused on resource management, it has now shifted to a more system thinking approach. Important in this system thinking approach is the human component necessary to make a transition to a more future-proof society. Especially giving more attention to supporting innovations from a niche perspective in this study provides knowledge about how to design for these niche markets. It helps the systems approach and stimulates changing the Industrial Ecology research agenda. By focusing more on the social psychological and communication side of the the problem in the system, I have contributed to the growth of Industrial Ecology principles in other areas of research. That barriers that were inhibitors for pro-environmental behaviour were in that sense not new, but with this study I've shown how to overcome these barriers from a social psychological perspective through a communication tool. Introducing psychology and framing design to system thinking will expand the research field of Industrial Ecology and strengthen the foundation necessary to continue a sustainable global transition. This small contribution to Industrial Ecology will hopefully be following my more interdisciplinary research stimulating the human component even more in the system's thinking approach.

Contribution to Science Communication

This study has also contributed to Science Communication theory. Innovation is an important aspect to Science Communication

and so is the multidisciplinary integration of different research areas. With this study I provide a new addition to a combination of the DBR and Double Diamond approach showing how this combined methodology can lead to a tool that is both theoretically validated as well as practically usable. Essential to bridge the design steps with the DBR was a Design Thinking mentality. This mentality found its expression in the multiple inclusions of the product developers and the continuous focus on visual expression of the content for the tool. This study showed how design step and engagement with the target group are necessary to improve workability and add value to the DBR process. The iteration roadmap in Chapter 2,1 showed the intersection between research and design and indicated where they overlapped, and where they switched from one to the other. My study can be used in further Science Communication research to understand how to approach similar complex problems and how to combine DBR with practical design step from the Double Diamond to expand the knowledge base and foundation that could stimulate a interdisciplinary and mixed method to solving communication problems. With this tool I find a way to communicate knowledge from different research fields to product developers responsible for innovation that can contribute to sustainable development in the Netherlands. In further research I hope this mixed method can be improved and strengthened its possibilities to provide justified outcomes due to more examples of similarly performed research.

CONTRIBUTION TO PRACTICE

Integration

An important characteristic of research performed at Delft University of Technology is that it is focused at creating innovations that shape the future. However, innovations only survive if they find enough support from the industry or public. Communicating these innovations is therefore a crucial part of an innovation's survival. I therefore see value in the integration between a research field such as Industrial Ecology and the connective abilities of Science Communication methods. By performing this integrated thesis study I've

develop a tool that can be used in practice. Not only can my study thus contribute to research inside the academic fields, but with the tool the knowledge can be spread and applied in the real-world. Not only does it mean that the theoretical input of the tool can be tested in practice, the tool simultaneously helps product developers to improve their message framing at their niche level to hopefully enable them to change regimes and ultimately the broader landscape to give more power to sustainable development.

Ethics

Although the tool shows promising abilities, and can provide product developers new insights in message framing for behaviour change, I shortly want to discuss the ethics of proceeding with research in the field of implementing influence mechanism to steer the unconscious human mind. Discourse about the morality of unconscious persuasion are necessary to continue research on tools such as the tool in this study. It can be unethical to use unconscious influencing methods because who is to determine what is in the best interest for an individual. The critique that unconscious influencing is not ethical because it takes advantage of the irrational human mind. From an ethical perspective, autonomy is one of the keystones that has to be protected. Honoring people their autonomy enables them to make their own decisions and take personal responsibility in the decision making of whether something is right or wrong. This could be a strong opposition in using behavioural influencing mechanisms such as nudges and framing. However, because my tool plays a part on only small scale and individual situations it shall not have large impacts or provoke crucial behavioural changes. But more importantly, since the tool included autonomy as one of the three constructs important to behaviour change it doesn't interfere or attack autonomy. Rather, this tool focuses for a big part of the consumer's feelings of autonomy keeping respect for the ethical consideration. The tool does not make the decision for the consumer, nor does it restrict them from opposing a certain decision, it only help the product developers to play into the

existing values and belief of their consumer, and therefore not harming their autonomy. To some extent, the nudges and framing tweaks that can be applied through using this tool can even help consumers in overcoming their bias and reacting to their true values that lie underneath these bias. In this sense, I do not foresee ethical issues with this tool, for it keeping autonomy in its value and only indirectly addressing a very small area of human behaviour. Regardless, the messenger should always consider the implication of their framing activities. Although people might perform the activity themselves, messengers carry part of the responsibility when they use influencing mechanism to influence behaviour. Proper discourse about the intention of the intervention, the desired behaviour, the cognitive involvement of the potential consumer and the possible effect of the outcomes of the intervention should have a prominent role in message framing design aimed at behaviour change.

6.3 RECOMMENDATIONS

In closure of this thesis I want to give some final recommendations to improve my study or continue my research.

TOOL RE-DESIGN

In Chapter 5.4 I have proposed several tool re-design recommendations that were obtained from the tool test analysis. I would suggest making a redesign with these suggestions, and continue the iterative process of consulting experts and then testing the tool with start-ups. To gain new insights, I would suggest to consults new behaviour expert and new product developers from other start-ups. Research on human behaviour is still going on, so therefore keeping the tool up to date as a dynamic tool will increase its validity. Perhaps testing out different versions of the tool in similar setting can shed more light on how effective each design is. Furthermore, these redesigns can then also maybe help to identify more design tweaks or justify several of the chosen ones to give more weight to the design tweaks in the tool.

Next to the tool re-design suggestions, I want to propose recommendations for future research that can strengthen the context of the tool and expand the knowledge on the integration of the three research fields.

INTERDISCIPLINARY RESEARCH

First of all, I think this study shows that there is already a lot of knowledge available in literature on each individual research field, but much less on the overlap. In continuation of my study I would suggest to first dig deeper into theoretical frameworks and reviews that cover parts of the overlap discussed in this thesis and putting this information together. These studies can then be included and integrated more in further development of the tool. The second research recommendation would be to take the literature search a step further and put together a multidisciplinary team. This team can then try to justify the links made in the tool to expand knowledge on the relationships

between the elements from the different expertise fields. If we want to move towards a sustainable or future-proof society, knowing what causes behavioural inaction and how to overcome this can be very beneficial. Another benefit of interdisciplinary research is that more knowledge on different topics such as supporting decision making process can be included, which strengthen the tool even more. More combined research in relation tot sustainable behaviour change is therefore my first and most important recommendation. With this interdisciplinary team my recommendation is to take social psychology as foundation and connected new and existing research and knowledge from the different team together to understand how to frame messages for behaviour change.

TOOL TESTING IN PRACTICE

Secondly, I propose to elaborate the above suggested theoretical research with further testing of the tool in practice. My tool is a preliminary version, and I recommend reassessing the tool and to improve the design, and to then focus on testing the tool in real-life situations. By bringing the tool to product developers the workability can be better assessed and improved. A tool will only be used if it is understood and easily accessible to potential users. An important aspect of the tool that has not yet been thoroughly discussed, but is very important in future research is the learning curve of the study. This study showed that the first tool usage session is difficult, but as understanding grows I expect the tool to become easier and a tool that product developer can fall refer to when in doubt. Over time, the user will then rely less of the expertise of the moderator, but can make the content of the tool their own and increase their self efficacy. This means, that if communicators want the tool to keep value it needs to be dynamics and constantly updated to increase performance or provide additional information in the form of more influence mechanisms of specific design tweak. My recommendation is thus to continue

testing the tool with product developers, and later potential other target groups, to keep providing new opportunities for user to learn from and with the tool. Doing research on how to design for start-ups, how to convince them to use a tool like this, and how to teach them to make the information in the tool their own are all part of this recommendation. In a follow up, a next step would then be to test the output of the tool usage to see if there is a significant improvement in sales of consumer behaviour change at the actual consumer. Although that is outside of the scope of this thesis, it is what this tool ultimately tries to achieve. So performing research of the effect of the tool would be a usefull next step.

THE POWER OF INTEGRATION

Lastly, with this study I hope to have contributed to both theory and practice by showing how to transform complex theory into a workable tool that gives insights into behaviour change design for sustainability from a barrier perspective. This workable tool introduces influence mechanisms that provide product developers an understanding on how to approach their message design process through the three behaviour change constructs. The tool has been a preliminary proposed intervention and more research is needed for it to grow and take off in real-life situations. But this could be possible with the given recommendations and further work. Even more so, I hope to have shown that doing research in the overlap of social psychology, sustainable behaviour barriers and user experience design is necessary to provide practical support in message framing for sustainable behaviour change and to, ultimately, contribute to achieving the climate goals that we have set for ourselves.

7. References

- Aarts, H., Verplanken, B., & Knippenberg, A. (1998). Predicting Behavior From Actions in the Past: Repeated Decision Making or a Matter of Habit? *Journal of Applied Social Psychology*, 28(15), 1355–1374. <https://doi.org/10.1111/j.1559-1816.1998.tb01681.x>
- Acharya, S., & Shukla, S. (2012). Mirror neurons: Enigma of the metaphysical modular brain. *Journal of Natural Science, Biology and Medicine*, 3(2), 118. <https://doi.org/10.4103/0976-9668.101878>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology*, 80(6), 2918–2940. <https://doi.org/10.1111/j.1559-1816.2002.tb00236.x>
- Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology and Health*, 26(9), 1113–1127. <https://doi.org/10.1080/08870446.2011.613995>
- Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, 95(9–10), 1082–1095. <https://doi.org/10.1016/j.jpubeco.2011.03.003>
- Altman, M. (2011). Heuristics. In *The Encyclopedia of Political Science* (p. 723).
- Ariely, D. (2010). *Predictably irrational: the hidden forces that shape our decisions* (6th ed.). New York: Harper.
- Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology*, 27(1), 14–25. <https://doi.org/10.1016/j.jenvp.2006.12.002>
- Bandura, A. (1992). Self-efficacy mechanism in psychobiologic functioning. In *Self-efficacy: Thought control in action* (pp. 335–394).
- Bannan, B. (2013). The Integrative Learning Design Framework: Educational Design Research, (July), 114–133.
- Barr, S., Building, A., Drive, R., & Ex, E. (2003). Strategies for sustainability: responsible environmental citizens and behaviour. *Area*, 35(3), 227–240. <https://doi.org/10.1111/1475-4762.00172>
- Bastien, J. M. C. (2010). Usability testing: a review of some methodological and technical aspects of the method. *International Journal of Medical Informatics*, 79(4), e18–e23. <https://doi.org/10.1016/j.ijmedinf.2008.12.004>
- Benford, R., & Snow, D. (2000). Framing Processes and Social Movements: An Overview and Assessment. *Annual Review of Sociology*, 26, 611–639.
- Blake, J. (1999). Overcoming the “value-action gap” in environmental policy: Tensions between national policy and local experience. *Local Environment*, 4(3), 257–278. <https://doi.org/10.1080/13549839908725599>
- Blank, S. (2011). *Small businesses vs. Startup with Steve Blank// Now I Know*. Sprinkle lab. Retrieved from <https://www.youtube.com/watch?v=ClA9ikESXYI>
- Boehm, L. (1994, June). The validity effect: A Search for Mediating Variables. *Society for Personality and Social Psychology*, 285–293.
- Bonnes, M., & Carrus, G. (2004). Environmental Psychology, Overview. *Elsevier*, 1 (March), 801–814.
- Bowen, G. A. (2008). Naturalistic inquiry and the saturation concept: A research note. *Qualitative Research*, 8(1), 137–152. <https://doi.org/10.1177/1468794107085301>
- Brewer, P. (2001). Value Words and Lizard Brains: Do Citizens Deliberate about Appeals to Their Core Values? *International Society of Political Psychology*, 22(1), 45–64.
- Brown, T., & Martin, R. (2016). The evolution of design thinking. *Harvard Business Review*, 55–71.
- Brown, T., & Wyatt, J. (2010). Design Thinking for Social Innovation. *Stanford Social Innovation Review*, 8(1), 30–35. <https://doi.org/10.1108/10878571011042050>
- Cachelin, A., & Ruddell, E. (2013). Framing for sustainability: The impact of language choice on educational outcomes. *Journal of Environmental Studies and Sciences*, 3(3), 306–315. <https://doi.org/10.1007/s13412-013-0131-2>
- Casado, F., Hidalgo, M. C., & García-Leiva, P. (2017). Energy efficiency in households: The effectiveness of different types of messages in advertising campaigns. *Journal of Environmental Psychology*, 53, 198–205. <https://doi.org/10.1016/j.jenvp.2017.08.003>
- Chong, D., & Druckman, J. N. (2007). Framing Theory. *Annual Review of Political Science*, 10(1), 103–126. <https://doi.org/10.1146/annurev.polisci.10.072805.103054>
- Christensen, C. M. (1997). The Innovator’s Dilemma. *Business*, 1–179. <https://doi.org/10.1515/9783110215519.82>
- Cialdini, R. B., & Goldstein, N. (2002). The science and practise of persuasion, (April), 40–50.
- Cialdini, R. B., & Schroeder, D. A. (1976). Increasing compliance by legitimizing paltry contributions: When even a penny helps. *Journal of Personality and Social Psychology*. <https://doi.org/10.1037/0022-3514.34.4.599>
- Cialdini, R. B., & Schultz, W. (2004). Understanding and motivating energy conservation via social norms. *William and Flora Hewlett Foundation*, 1–6.
- Cobb, M. D. (2005). Framing Effects on Public Opinion about Nanotechnology. *Science Communication*, 27(2), 221–239. <https://doi.org/10.1177/1075547005281473>
- Cohen, D., & Crabtree, B. (2006). Semi-structured Interviews Recording Semi-Structured interviews. *Qualitative Research Guidelines Project*, 2. Retrieved from <http://www.qualres.org/HomeSemi-3629.html>
- Cowan, N. (2001). The magical number 4 in short term memory. A reconsideration of storage capacity. *Behavioral and Brain Sciences*, 24(4), 87–186. <https://doi.org/10.1017/S0140525X01003922>
- Crompton, T., & Kasser, T. (2010). Human identity: A missing link in environmental campaigning. *Environment*, 52(4), 23–33. <https://doi.org/10.1080/00139157.2010.493114>

- Cuevas, H. M., Bolstad, C. A., Oberbreckling, R., LaVoie, N., & Kuhl Mitchell, D. (2012). Benefits and Challenges of Multidisciplinary Project Teams: "Lessons Learned" for Researchers and Practitioners Scholarly Commons Citation. *ITEA Journal*, 33, 58–65. Retrieved from <http://commons.erau.edu/publication/108>
- DBR Collective, (2002). Design-based research: An emerging paradigm for educational inquiry. *Educational Research*, 32(1), 5–8. <https://doi.org/10.3102/0013189X032001005>
- de Vries, G. (2017). How Positive Framing May Fuel Opposition to Low-Carbon Technologies. *Journal of Language and Social Psychology*, 36(1), 28–44. <https://doi.org/10.1177/0261927X16663590>
- de Vries, G., Terwel, B. W., Ellemers, N., & Daamen, D. D. L. (2015). Sustainability or profitability? How communicated motives for environmental policy affect public perceptions of corporate greenwashing. *Corporate Social Responsibility and Environmental Management*, 22(3), 142–154. <https://doi.org/10.1002/csr.1327>
- Design Council. (2007). A Study of the Design Process. Design Council, 44(0), 1–144. Retrieved from [http://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council_\(2\).pdf](http://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council_(2).pdf)
- Design Council. (2014). Design Council. Retrieved from <https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond>
- Design Council. (2015). The Design Process: What is the Double Diamond?
- Desmet, P. M. A., & Hekkert, P. (2007). Framework of 10 product experience. *International Journal of Design*, 1(1), 57–66. <https://doi.org/10.1162/074793602320827406>
- Dijksterhuis, A. (2007). *Het slimme onbewuste* (1st ed.). Soest: Prometheus.
- Druckman, J. N. (2001). Using Credible Advice to Overcome Framing Effects. *Oxford Journals*, 17(1), 62–82.
- Druckman, J. N., & Bolsen, T. (2011). Framing, motivated reasoning, and opinions about emergent technologies. *Journal of Communication*, 61(4), 659–688. <https://doi.org/10.1111/j.1460-2466.2011.01562.x>
- Druckman, J. N., & Mcdermott, R. (2016). Emotion and the Framing of Risky Choice Author (s): James N . Druckman and Rose McDermott Published by : Springer Stable URL : <http://www.jstor.org/stable/40213319>, 30(3), 297–321.
- Entman, R. M. (1993). Framing - Toward Clarification of a Fractured Paradigm. *Journal of Communication*, 43(4), 51–58. <https://doi.org/10.1111/j.1460-2466.1993.tb01304.x>
- Festinger, L. (2014). a Theory of Social Comparison Processes, (1954).
- Fisher, W. A., Fisher, J. D., & Harman, J. (2003). The Information-Motivation-Behavioral Skills Model: A General Social Psychological Approach to Understanding and Promoting Health Behavior. *Social Psychological Foundations of Health and Illness*, (December), 82–106. <https://doi.org/10.1002/9780470753552.ch4>
- Fleming, M., & Levie, H. (1979). *Instructional message design: principles from the behavioural sciences* (2nd ed.). Englewood Cliffs: Educational Technology Publications.
- Fransson, N., & Gärling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology*, 19(4), 369–382. <https://doi.org/10.1006/jevp.1999.0141>
- Freedman, J., & Fraser, S. (1966). Compliance Without Pressure : The Foot-in-the-door technique. *Journal of Personality and Social Psychology*, 4(2), 195–202.
- Frijda, N. H., & Sundararajan, L. (2007). Emotion Refinement: A Theory Inspired by Chinese Poetics. *Perspectives on Psychological Science*, 2(3), 227–241. <https://doi.org/10.1111/j.1745-6916.2007.00042.x>
- Gadenne, D., Sharma, B., Kerr, D., & Smith, T. (2011). The influence of consumers' environmental beliefs and attitudes on energy saving behaviours. *Energy Policy*, 39(12), 7684–7694. <https://doi.org/10.1016/j.enpol.2011.09.002>
- Gagestein, S. (2018). Expert interview about framing and tool development. Amsterdam: Taalstrategie.
- Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24–40. <https://doi.org/10.1016/j.eist.2011.02.002>
- Geiger, J. (2018). Expert interview on sustainable behaviour, tool development and tool testing. Groningen University.
- Gifford, R. (2007). Environmental psychology and sustainable development: Expansion, maturation, and challenges. *Journal of Social Issues*, 63(1), 199–212. <https://doi.org/10.1111/j.1540-4560.2007.00503.x>
- Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66(4), 290–302. <https://doi.org/10.1037/a0023566>
- Gifford, R. (2013). Dragons, mules, and honeybees: Barriers, carriers, and unwitting enablers of climate change action. *Bulletin of the Atomic Scientists*, 69(4), 41–48. <https://doi.org/10.1177/0096340213493258>
- Gifford, R. (2015, July 11). The road to climate hell. *NewScientist*, pp. 28–33. Retrieved from http://www.dragonsofinaction.com/wp-content/uploads/2015/12/rgifford_33_dragons_new_scientist.pdf
- Gifford, R., & Comeau, L. A. (2011). Message framing influences perceived climate change competence, engagement, and behavioral intentions. *Global Environmental Change*, 21(4), 1301–1307. <https://doi.org/10.1016/j.gloenvcha.2011.06.004>
- Gottweis, H. (2005). Regulating genomics in the 21st century: From logos to pathos? *Trends in Biotechnology*, 23(3), 118–121. <https://doi.org/10.1016/j.tibtech.2005.01.002>
- Gressgård, R. (2015). The power of (re)attachment in urban strategy: Interrogating the framing of social sustainability in Malmö. *Environment and Planning A*, 47(1), 108–120. <https://doi.org/10.1068/a130167p>

- Groening, C., Sarkis, J., & Zhu, Q. (2018). Green marketing consumer-level theory review: A compendium of applied theories and further research directions. *Journal of Cleaner Production*, 172, 1848–1866. <https://doi.org/10.1016/j.jclepro.2017.12.002>
- Guéguen, N., Silone, F., David, M., & Pascual, A. (2015). THE EFFECT OF THE “EVOKING FREEDOM” TECHNIQUE ON AN UNUSUAL AND DISTURBING REQUEST 1. *Psychological Reports*, 116(3), 936–940. <https://doi.org/10.2466/21.PRO.116k31w1>
- Handgraaf, M. (2018). Expert interview about behaviour change barriers and influence mechanisms. Delft: Wageningen University.
- Handgraaf, M. J. J., Van Lidth de Jeude, M. A., & Appelt, K. C. (2013). Public praise vs. private pay: Effects of rewards on energy conservation in the workplace. *Ecological Economics*, 86, 86–92. <https://doi.org/10.1016/j.ecolecon.2012.11.008>
- Haugtvedt, C. P., & Wegener, D. T. (1994). Message Order Effects in Persuasion: An Attitude Strength Perspective. *Journal of Consumer Research*, 21(1), 205. <https://doi.org/10.1086/209393>
- Heimlich, J., & Ardoin, N. (2008). Understanding behavior to understand behavior change: a literature review. *Environmental Education Research*, 14(3), 215–237. <https://doi.org/10.1080/13504620802148881>
- Hekkert, P., & Schifferstein, H. N. J. (2008). Introducing product experience. Product Experience. Elsevier Ltd. <https://doi.org/10.1016/B978-0-08-045089-6.50003-4>
- Hermesen, S., & Renes, R.-J. (2014). *Ontwerpen voor gedragsverandering* (1st ed.). Utrecht: Grafish Bedrijf Tuijtel.
- Herrington, J., McKenney, S., Reeves, T., & Olive, R. (2007). Design-based research and doctoral students: Guidelines for preparing a dissertation proposal. *Proceedings of the World Conference on Educational Multimedia, Hypermedia and Telecommunications, 2007(2007)*, 4089–4097. Retrieved from <http://researchrepository.murdoch.edu.au/6762/%5Cnpapers3://publication/uuid/373E7103-6768-447C-A4DB-C8E1712589A9>
- Heshmat, S. (2015). What is Confirmation Bias? Retrieved from <https://www.psychologytoday.com/intl/blog/science-choice/201504/what-is-confirmation-bias>
- Hoekstra, J. (2018). Expert interview about sustainable behaviour change, sustainable behaviour barriers and consumer behaviour. Utrecht.
- Houde, S., & Todd, A. (2010). List of behavioral economics principles that can inform energy policy. Lawrence Berkeley National Lab and Precourt Energy Efficiency Center at Stanford University, 2, 17. Retrieved from [http://www.ewp.industry.gov.au/sites/prod.ewp.industry.gov.au/files/submissions/Energy White Paper/EWPGP128-802.pdf](http://www.ewp.industry.gov.au/sites/prod.ewp.industry.gov.au/files/submissions/Energy%20White%20Paper/EWPGP128-802.pdf)
- Hovestadt, P. (2018). Expert interview about behaviour change barriers and influence mechanisms. Delft: Groen4life.
- Hurd, D. (2005). Common cause. *New Statesman*, 134(4760), 50–51. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=18391050&site=ehost-live>
- Jones, D. M. (2002). The 7+2 Urban Legend. *English*, 240, 1–7. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.12.8405>
- Kahneman, D. (2011). *Thinking fast thinking slow* (1st ed.). New York: Farrar, Straus and Giroux.
- Kahneman, D. (2016). Cognitive Biases, Heuristics, and Illusions That Daniel Kahneman Thinks Investors Should Know. Retrieved from <https://vintagevalueinvesting.com/6-cognitive-biases-heuristics-and-illusions-that-daniel-kahneman-thinks-investors-should-know/>
- Kamp, H. G. J., & Mansveld, W. J. Groene Groei: voor een sterke, duurzame economie [kamerbrief] (2013). The Netherlands. Retrieved from <https://www.rijksoverheid.nl/onderwerpen/duurzame-economie/documenten/kamerstukken/2013/03/28/kamerbrief-groene-groei-voor-een-sterke-duurzame-economie>
- Kempton, W., Boster, J. S., & Hartley, J. A. (1995). Environmental values in American culture. *Ecological Economics*, 27(1), xiii, 320.
- Kok, G., Gottlieb, N. H., Peters, G.-J. Y., Mullen, P. D., Parcel, G. S., Ruiter, R. a C., ... Bartholomew, L. K. (2015). A Taxonomy of Behavior Change Methods; an Intervention Mapping Approach. *Health Psychology Review*, 7199, 1–32. <https://doi.org/10.1080/17437199.2015.1077155>
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why Do People Behave Environmentally and What are the Barriers to Pro-Environmental Behaviour. *Environmental Education Research*, 8(3), 239–260. <https://doi.org/10.1080/1350462022014540>
- Kultar, S. (2007). Quantitative Social Research Methods. PhD Proposal. <https://doi.org/10.1017/CBO9781107415324.004>
- Lakoff, G. (2010). Why it Matters How We Frame the Environment. *Environmental Communication*, 4(1), 70–81. <https://doi.org/10.1080/17524030903529749>
- Lee, Y. Ki, Kim, S., Kim, M. Seong, & Choi, J. Gu. (2014). Antecedents and interrelationships of three types of pro-environmental behavior. *Journal of Business Research*, 67(10), 2097–2105. <https://doi.org/10.1016/j.jbusres.2014.04.018>
- Lingsma, J. (2018). Expert interview about the Mentality model by Motivaction. Amsterdam: Motivaction.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57(9), 705–717. <https://doi.org/10.1037//0003-066X.57.9.705>
- Locke, E. A., & Latham, G. P. (2006). New Directions in Goal-Setting Theory. *Current Directions in Psychological Science*, 15(5), 265–268. <https://doi.org/10.1111/j.1467-8721.2006.00449.x>
- Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17(3–4), 445–459. <https://doi.org/10.1016/j.gloenvcha.2007.01.004>

- Lynn, M. (1996). Seven Ways to Increase Servers' Tips. *Cornell Hotel and Restaurant Administration Quarterly*, 37, 24–29. <https://doi.org/10.1177/001088049603700315>
- Magee, L., Scerri, A., James, P., Thom, J. A., Padgham, L., Hickmott, S., ... Cahill, F. (2013). Reframing social sustainability reporting: Towards an engaged approach. *Environment, Development and Sustainability*, 15(1), 225–243. <https://doi.org/10.1007/s10668-012-9384-2>
- Mayer, R. E. (2009). Cognitive Theory of Multimedia Learning. *The Cambridge Handbook of Multimedia Learning*, 1(2), 31–48. https://doi.org/10.1207/s15326985ep4102_2
- Melchior, S. (2018). Expert interview about nudging for behaviour change and my design tool development. Rotterdam: Maverick.
- Merriam-Webster. (n.d.). Definition of belief. Retrieved November 8, 2017, from <https://www.merriam-webster.com/dictionary/belief>
- Michie, S., Stralen, M. M. Van, & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions The behaviour change wheel : A new method for characterising and designing behaviour change interventions, 42(April). <https://doi.org/10.1186/1748-5908-6-42>
- Micklem, W. (2017). William Micklem: The Mental Attitude Empowering Riders and Coaches. Retrieved from <http://eventingnation.com/william-micklem-the-mental-attitude-empowering-riders-and-coaches/>
- Middendorf, W. (2012). inSights. Delft: Fabrique. Retrieved from fabrique.nl/insights
- Miller, G. (1955). The magical number two, plus or minus one: Some limits on our capacity for processing musical information. *Psychological Review*, 101(2), 343–352. <https://doi.org/10.1177/102986490200600205>
- Miller, R., & Wozniak, W. (2001). Counter-attitudinal advocacy: Effort vs. self-generation of arguments. *Current Research in Social Psychology*, 6(4).
- Ministry of Economic Affairs. Energieagenda: Naar een CO2-arme energievoorziening (2016). Retrieved from <https://www.rijksoverheid.nl/documenten/rapporten/2016/12/07/ea>
- Monroe, M. (2003). Two Avenues for Encouraging Conservation Behaviors. *Human Ecology Review*, 10(2), 113–125. <https://doi.org/10.1177/1086026601141001>
- Nefkens, R. (2018). Start-up interview and tool test. Amsterdam: The Bamboo Brush Society.
- Nerlich, B., Koteyko, N., & Brown, B. (2010). Theory and language of climate change communication. *WIREs Climate Change*, 1(1), 97–110. <https://doi.org/10.1002/wcc.002>
- Nessler, D. (2016). How to apply a design thinking, HCD, UX or any creative process from scratch, 1–10. Retrieved from <https://medium.com/digital-experience-design/how-to-apply-a-design-thinking-hcd-ux-or-any-creative-process-from-scratch-b8786efbf812#ops3bury>
- Nisbett, R., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment*. Englewood Cliffs: Prentice-Hall.
- Opendakker, R. (2006). Advantages and disadvantages of four interview techniques in qualitative research. *Forum Qualitative Sozialforschung*, 7(4). <https://doi.org/10.1177/1468794107085298>
- Orngreen, R. (2015). Reflections on Design-Based Research In Online Educational and Competence Development Projects, 468, 20–38. <https://doi.org/10.1007/978-3-319-27048-7>
- Pentland, A. (2015). *Social Physics* (2nd ed.). New York: Penguin Group.
- Petty, R. E., & Cacioppo, J. . (1986). The elaboration likelihood model of persuasion. *Advances in Experimental Social Psychology*, 19, 123–183. <https://doi.org/10.1558/jjssl.v14i2.309>
- Pilaj, H. (2017). The Choice Architecture of Sustainable and Responsible Investment: Nudging Investors Toward Ethical Decision-Making. *Journal of Business Ethics*, 140(4), 743–753. <https://doi.org/10.1007/s10551-015-2877-9>
- Ploumen, L., & Kamp, H. Beleidsbrief “Maatschappelijk verantwoord ondernemen loont” [Kamerbrief], Rijksoverheid § (2013). The Netherlands. Retrieved from <https://www.rijksoverheid.nl/onderwerpen/duurzame-economie/documenten/beleidsnota-s/2013/06/28/beleidsbrief-maatschappelijk-verantwoord-ondernemen-loont>
- Portheijne, J., & van Eeden, S. (2018). Start-up interview and tool test. Amsterdam: KarTent.
- Pratkanis, A. R. (2007). *The Science of Social Influence*. New York: Psychology Press. <https://doi.org/doi:10.4324/9780203818565>
- Prochaska, J. O., Diclemente, C. C., & Norcross, J. C. (1993). In search of how people change: Applications to addictive behaviors. *Journal of Addictions Nursing*, 5(1), 2–16. <https://doi.org/10.3109/10884609309149692>
- Raju, R. (2013). Literature Review in Research Methodologies. Retrieved from <https://www.slideshare.net/raisonsamraju2800/literature-review-in-research-methodology>
- Reeves, T. (2006). Design Research from a Technology Perspective. In J. van den akker, K. Gravemeijer, S. McKenney, & N. Nieveen (Eds.), *British Journal of Educational Technology* (pp. 52–66). UK: Routledge.
- Reingen, P. H. (1982). Test of a list procedure for inducing compliance with a request to donate money. *Journal of Applied Psychology*, 67(1), 110–118. <https://doi.org/10.1037/0021-9010.67.1.110>
- Roeser, S. (2010). Intuitions, emotions and gut reactions in decisions about risks: Towards a different interpretation of “neuroethics.” *Journal of Risk Research*, 13(2), 175–190. <https://doi.org/10.1080/13669870903126275>
- Roode, H. (2018). Start-up interview and tool test. The Hague: Seepje.

- Roozenburg, N. F. M., & Eekels, J. (2003). *Productontwerpen, structuur en methoden* (2nd ed.). Utrecht: Lemma.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Santos, M. D., Leve, C., & Pratkanis, A. R. (1994). Hey Buddy, Can You Spare Seventeen Cents? Mindful Persuasion and the Pique Technique. *Journal of Applied Social Psychology*, 24(9), 755–764. <https://doi.org/10.1111/j.1559-1816.1994.tb00610.x>
- Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research Methods for Business Students*. Research methods for business students. <https://doi.org/10.1007/s13398-014-0173-7.2>
- Schubert, C. (2017). *Green nudges: Do they work? Are they ethical? Ecological Economics* (Vol. 132). <https://doi.org/10.1016/j.ecolecon.2016.11.009>
- Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). Destructive, and Reconstructive Power of Social Norms. *Psychological Science*, 18(5), 429–434. <https://doi.org/10.1111/j.1467-9280.2007.01917.x>
- Schultz, W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and Applied Social Psychology*, 21(1), 25–36. <https://doi.org/10.1207/s15324839951036533>
- Schwartz, S. H. (1977). Normative Influences on Altruism 1. *Advances in Experimental Social Psychology*, 10(September), 221–279.
- Seebauer, S., Fleiß, J., & Schweighart, M. (2017). A Household Is Not a Person: Consistency of Pro-Environmental Behavior in Adult Couples and the Accuracy of Proxy-Reports. *Environment and Behavior*, 49(6), 603–637. <https://doi.org/10.1177/0013916516663796>
- Simon, H. (1989). *The Artificial Intelligence and Psychology Project*. Pittsburgh.
- Sleenhoff, S. (2016). *Emotions matter for public engagement in the emerging bio-based economy*.
- Slob, G. (2018). Expert interview about behaviour change construct, influence mechanism and model development. Nijmegen: Behaviour Change Group.
- Smith, A., Voß, J. P., & Grin, J. (2010). Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Research Policy*. <https://doi.org/10.1016/j.respol.2010.01.023>
- Smith, J. (2018). Start-up interview and tool test. Delft: Supersola.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317. <https://doi.org/10.1016/j.jenvp.2008.10.004>
- Stern, P. C. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, 56(3), 407–424. <https://doi.org/10.1111/0022-4537.00175>
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, 6(2), 81–97. <https://doi.org/10.2307/2083693>
- Strohmetz, D. B., Rind, B., Fisher, R., & Lynn, M. (2002). Sweetening the Till: The Use of Candy to Increase Restaurant Tipping. *Journal of Applied Social Psychology*, 32(2), 300–309. <https://doi.org/10.1111/j.1559-1816.2002.tb00216.x>
- Sunstein, C. R. (2014). Nudging: A Very Short Guide. *Journal of Consumer Policy*, 37(4), 583–588. <https://doi.org/10.1007/s10603-014-9273-1>
- Swim, J., Fielding, K. S., & Hornsey, M. J. (2014). Developing a social psychology of climate change. *European Journal of Social Psychology*, 44(5), 413–420. <https://doi.org/http://dx.doi.org/10.1002/ejsp.2058>
- Thaler, R., & Sunstein, C. R. (2008). *Nudge*. New Haven & London: Caravan books.
- Tripp, B. (2018). Start-up interview. Delft: E-trailer.
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–458. <https://doi.org/10.1126/science.7455683>
- Tversky, A., & Shafir, E. (1992). Choice Under Conflict: The Dynamics of Deferred Decision. *Psychological Science*, 3(6), 358–361. <https://doi.org/10.1111/j.1467-9280.1992.tb00047.x>
- Tschimmel, K., & Pombo, F. (2006). Sapiens and Demens in Design Thinking – Perception as Core. *Design System Evolution Proceedings of the 6th EAD Conference*, (June).
- Udalov, V., Perret, J., & Vasseur, V. (2017). Environmental motivations behind individuals' energy efficiency investments and daily energy-saving behaviour: evidence from Germany, the Netherlands and Belgium. *International Economics and Economic Policy*, 14(3), 481–499. <https://doi.org/10.1007/s10368-017-0381-7>
- Uiterkamp, A. J. M. S., & Vlek, C. (2007). Practice and Outcomes of Multidisciplinary Research for Environmental Sustainability. *Journal of Social Issues*, 63(1), 175–197. <https://doi.org/10.1111/j.1540-4560.2007.00502.x>
- van Beek, L. (2018a). Expert interview about tool design. Amsterdam: De Energiebespaarders.
- van Beek, L. (2018b). Start-up interview and tool test. Amsterdam: De Energiebespaarders.
- van Boeijen, A., Daalhuizen, J., Zijlstra, J., & van der Schoor, R. (Eds.). (2013). *Delft Design Guide*. Amsterdam: BIS Publishers.
- van Bruinessen, E. (2018). Start-up interview and tool test. Amsterdam: Yoni Care.
- van de Velde, L., Verbeke, W., Popp, M., & van Huylenbroeck, G. (2010). The importance of message framing for providing information about sustainability and environmental aspects of energy. *Energy Policy*, 38(10), 5541–5549. <https://doi.org/10.1016/j.enpol.2010.04.053>
- van der Stigchel, S. (2016). *Zo werkt aandacht* (2nd ed.). Amsterdam: Maven Publishing.

- van der Sanden, M., & Vries, D. (2016). Science and Technology Education and Communication.
- van der Sanden, M., & Meijman. (2012). A step-by-step approach for science communication practitioners: a design perspective. *Journal of Science Communication (JCOM)*, 11(2), 1–9. Retrieved from [http://jcom.sissa.it/sites/default/files/documents/Jcom1102\(2012\)A03.pdf](http://jcom.sissa.it/sites/default/files/documents/Jcom1102(2012)A03.pdf)
- Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18. <https://doi.org/10.1080/15710880701875068>
- van der Werf, G. (2018). Expert interview about the Mentality model by Motivaction. Amsterdam: Motivaction.
- van der Werf, G., Visscher, J., & Königs, M. (2015). *Burgers komen in beweging voor energie*. Amsterdam.
- van Gorp, B., & van der Goot, M. J. (2012). Sustainable Food and Agriculture: Stakeholder's Frames. *Communication, Culture & Critique*, 5(2), 127–148. <https://doi.org/10.1111/j.1753-9137.2012.01135.x>
- van Iersel, B. (2018). Start-up interview and tool test. Amsterdam: Bolt Mobility.
- Vercauteren, C. (2013). Community gardens as learning spaces for sustainable food practices. *Proceedings of SCORAI Europe & Incontext Workshop*, 327–342. Retrieved from <http://repository.tudelft.nl/islandora/object/uuid:a6090c6e-7127-4b35-8186-3a83e74345b1?collection=research>
- Visser, A. (2018). Expert interview about behaviour change construct, influence mechanism and model development. Nijmegen: Behaviour Change Group.
- Visser, W. (2011). The Age of Responsibility : CSR 2.0 and the New DNA of business. *Journal of Business Systems, Governance and Ethics*, 5(3), 7–22. <https://doi.org/10.15209/jbsge.v5i3.185>
- Vrijer, T. (2017). Policy options for sustainable protein consumption in the Netherlands. TU Delft.
- Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, 53(4), 5–23. <https://doi.org/10.1007/BF02504682>
- Webliography. (2000). Design Research Reeves. Retrieved from <http://dbr.coe.uga.edu/FAQ.html>
- Weinschenk, S. (2011). *100 Things Every Designer Needs to Know About People*. Berkeley: New Riders.
- Weinschenk, S. (2016). *100 more things every designer needs to know about people*. Berkeley: New Riders.
- Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology*, 29(1), 13–23. <https://doi.org/10.1016/j.jenvp.2008.05.003>
- WRR. (2014). Met kennis van gedrag beleid maken. WRR-Rapport, 110.
- WWR. (2017). Weten is nog geen doen.
- Zachrisson, J., & Boks, C. (2012). Exploring behavioural psychology to support design for sustainable behaviour research. *J. of Design Research*, 10(1/2), 50. <https://doi.org/10.1504/JDR.2012.046139>
- Zaltman, G. (2003). *How Consumer Think: Essential Insights Into the Mind of the Market*. Boston: Harvard Business Press.
- Zhai, P., Williams, E. D., Nog, W. I. S., Doen, G., Wolske, K. S., Stern, P. C., ... Neame, C. (2014). Unleashing the Powerful Few: Sustainable Investing Behaviour of Wealthy Private Investors. *Energy Policy*, 38(May), 330–343. <https://doi.org/10.1016/j.enpol.2012.12.041>

8. Appendices

I. ITERATIONS

Phase DBR	Phase Double Diamond	Steps	Goal	Results	Theory (T), Practice (P), Design, Validation	With who?
Defining scope	Phase 1-Discover	Literature research	Scoping the research	Research question	Theory T, Design	
Step 1 (analysis of practical problems by researchers and practitioners)	Phase 1-Discover	Literature review	Compile available information	Model collection and selection	Theory T	
	Phase 1-Discover	Expert conversation	Gaining knowledge	Constructs of behaviour	Theory P, Validation	
Step 1 (develop theoretical framework)	Phase 1-Discover	Multiple model analysis	Finding most frequent appearing constructs and terms	New behaviour change flow chart, elements necessary for in tool	Theory T	
	Phase 2-Define	Element selection	Finding which elements are needed in tool	Selection of elements (target group, barriers, mechanisms, design)	Theory P	Steven Melchior, Sarah Gagestein, Jolijn Mes
	Phase 2-Define	Framework element tables	Making separate tables for each important construct (decision constructs, barriers, influence mechanisms, design tweaks)	Information categorization	Theory T	
	Phase 2-Define	First framework development	Design something that shows the links between elements	Structuration	Design	
	Phase 2-Define	Target group choice and link to barriers	Which barriers are important to which target group	Linking elements	Theory P	Jorrit Hoekstra
	Phase 2-Define	Framework tables	Validating theory in practice with experts	Narrow selection and categorization	Theory P	Sarah Gagestein, Jolijn Mes, Steven Melchior

Methodology step 2 (development of solutions with a theoretical framework)	Phase 3 - Develop	Tool elements	Putting the tables together	First tool set-up	Design	
	Phase 2 - Define	Tool validation	Checking content	New content	Theory T	
	Phase 2 - Define	Tool validation	Checking content	New content	Theory P	
	Phase 3 - Develop	First draft tool in table	Making content understandable	Target group take-out and input for barriers	Theory P	Gert Slob, Anouk Visser
	Phase 3 - Develop	Content second draft in excel	New content with literary back-up	New content with back-up	Theory T	
	Phase 2 - Define	Validation second draft in excel	Is the content selected correct	Validated content	Theory P	Michel Handgraaf, Ruud van Breda, Petra Hovestadt, Marleen Onwezen
	Phase 3 - Develop	Second draft tool in table and de-sign	Making it useful	Workable and showable tool	Design	
Methodology 3 (evaluation and testing of solutions in practice)	Phase 3 - Develop	Rough test 1: Testing tool with end-user	Find out what they know, need and understand	New input to make it more workable and easier to understand, need for examples, change words	Theory P	Focus group, E-trailer, Energiebespaarders, Bolt Mobility, Kartent, Yoni, Seepje, Bamboo Brush, Supersola
	Phase 3 - Develop	Validating second draft tool	Checking content	New content	Theory P	Gert Slob, Marleen Onwezen
	Phase 3 - Develop	Validating design second draft tool	Checking design	New design choices	Theory P, Design	Anna van der Togt, Leo van Beek, Focus group
Methodology step 2 (development of solutions with a theoretical framework)	Phase 2 - Define	Third draft tool in design and booklet	Make it useable and design booklet	Tool and booklet for testing	Design	

Methodology 3 (evaluation and testing of solutions in practice)	Phase 2-Define	Developing tool test with start-ups	Developing the test	Some tweaks	Theory P	Josefine Geiger, Gerard van der Werf, Jorn Llingsma
	Phase 4-Deliver	Testing tool with start-ups	Finding out about understandability, workability and usefulness		Theory P	Focus group, Energiebespaarders, Kartent, Yoni, Seepje Bamboo Brush, Supersola
	Phase 4-Deliver	Documentation and evaluation	Producing design principles		Theory T, Design	
Methodology 4 (documentation and reflection to produce design principles)	Phase 4-Deliver	Conclusion, evaluation and recommendation				

II. INTERVIEW GUIDES

BEHAVIOURAL EXPERTS

1. Probleemanalyse. Welke vragen/stappen/onderdelen moeten er uitgezocht/gevraagd worden om de situatie te schetsen en de doelgroep te bepalen? Wat is stap 1 om een bedrijf te helpen als ze gedrag van hun consumenten willen veranderen?
 - 1.1 Je verschillende doelgroepen onderscheiden?
 - 1.2. Ondervinden ze allemaal dezelfde barrières? Kun je deze koppelen?
 - 1.3. Hoe gedetailleerd moeten de gebruiker geformuleerd worden?
2. Ik heb gekeken naar bewust en onbewust gedrag. Aan het bewust koppel ik graag the Theory of Planned Behaviour, voor onbewuste gedragsverandering kijk ik meer naar Kahnemans Dual-system thinking. Voor gedragsverandering op het gebied van duurzaamheid, dus het aanschaffen van een duurzaam product, wat is dan belangrijker? Bewust of onbewust?
3. Barrières. Welke belangrijkste factoren zijn er die gedragsverandering op het gebied van duurzaamheid tegenhouden?
 - 3.1 Voorbeelden:
 - Te weinig kennis (Knowledge)
 - Verkeerde mening (Opinion)
 - Twijfel/onzekerheid (Reactance)
 - Doeltreffendheid (Self-efficacy)
 - Inertia
 - Scepticisme (Scepticism)
 - Sociale norm (Social Norm)
4. Technieken. Laten we de barrières één voor één langslopen. Welke technieken passen bij elke barrière om ze te overkomen? Hoe kunnen we inspelen op gedrag?
 - 4.1 Voorbeelden: kleine keuze architectuur, gains over losses, gratis proef, niet goed geld terug, erkenning, (schijn)keuzevrijheid
5. Met wie moet ik nog meer praten?

DESIGNERS

1. Wat is jullie methode om te ontwerpen voor gedragsverandering?
 - 1.1 Hebben jullie hiet een standard aanpak voor?
 - 1.2 Welke ontwerpstappen komen hieraan te pas?
2. Wat wil je te weten komen over je doelgroep?
 - 2.1 Wanneer weet je voldoende over een doelgroep?
 - 2.2 Hoe breng je dit in kaart?
 - 2.3 Wat doe je met de informatie?
3. Wat is de rol van sociale psychologie bij jullie?
 - 3.1 Hoe belangrijk is gedrag?
4. Wat zijn trucjes die je gebruikt bij UX design om bepaald gedrag te verkrijgen?
 - 4.1 Is hier een bestaande lijst voor?
 - 4.2. Hoe maak je de keuze voor welke trucjes belangrijk zijn?

5. Wat is belangrijk bij het ontwerpen van een tool die helpt bij ontwerpen? Hoe maak je een tool bruikbaar?
 - 5.1 Welke spelelementen moeten erin zitten?
 - 5.2 Hoe kun je gebruik maken van aethetische use-cues om de tool begrijpelijk te maken?
 - 5.3 Wat is de rol van het uiterlijk bij het maken van een tool?
6. Hoe zet je een co-creatie sessie op met 3 personen? Is hier literatuur voor?
 - 6.1 Hoe test je een tool?
 - 6.2 Hoe zet je een testsessie op?
 - 6.3 Wat voor conclusies kun je uit een tooltest halen?

III. EXPERT SELECTION

	Name	Profession	Type of institute/ company	Background
A	Steven Melchior	Behaviour expert	Maverick (Behaviour change consultancy)	Psychology, and behaviour change
B	Sarah Gagestein	Framing expert	Taaladvies (Framing consultancy)	Communication and information science, and linguistics
C	Jolijn Mes	Framing expert	Taaladvies (Framing consultancy)	Applied linguistics
D	Gert Slob	Behavioural psychologist	Behaviour change group (behavior change education and advice)	Psychology
E	Anouk Visser	Behavioural psychologist	Behaviour change group (behavior change education and advice)	Psychology, and behaviour change
F	Ruud van Breda	Behavioural psychologist	D&B Gedrag (Behaviour change consultancy)	Psychology, and behaviour change and social influence
G	Michel Handgraaf	Behavioural economist	Wageningen University (social sciences department)	Social psychology
H	Petra Hovestadt	Sustainable behaviour coach	Behaviour management	Applied psychology
I	Josefine Geiger	Behaviour researcher	University of Groningen (behavioural and social sciences department)	Social psychology
J	Jorrit Hoekstra	Behaviour researcher	Motivaction (Market research bureau)	Environment & resource Management
K	Gerard van der Werf	Behaviour strategy behavior	Motivaction (Market research bureau)	Economic Psychology
L	Jorn Lingsma	Research Consultant	Motivaction (Market research bureau)	Social Psychology
M	Marleen Onwezen	Social psychologist	Wageningen University (Consumer and chain department)	Social Psychology
Designers and peer group				
I	Anna van der Togt	UX Designer	Liveworkstudio (Design consultancy)	Industrial Design Engineering
II	Leo van Beek	Designer and developer	Sustainable start-up	Industrial Design Engineering
III	Design peer group	Students & Designers	Industrial design/science communication	Industrial design/science communication

IV. START-UP & FOCUS GROUP SELECTION

	Start-up	Product Developer	Product/service
1	De Energiebespaarders	Leo van Beek	Sustainable housing renovation contracting
2	E-trailer	Boy Tripp	Sustainable trailer monitoring products
3	Bolt Mobility	Bob van Iersel	Sustainable scooter
4	Seepje	Harry Roode	Sustainable household products
5	KarTent	Jan Portheijne en Sofie van Eeden	Sustainable festival tents
6	Bamboo Brush Society	Roger Nefkens	Sustainable toothbrush
7	Supersola	Julius Smith	Portable solar panel
8	Yoni Care	Eva van Bruinessen	Sustainable tampons

Student	Industrial Design Engineering Bachelor	Industrial Design Engineering Master	Science Communication
1	X	X	X
2	X	X	X
3			X
4	X	X	

V. USER GUIDE TOOL

Introduction to the tool:

The main function of the tool is to give you more insights in behaviour change mechanisms and tweaks that can help improve your content marketing. It is a compilation of some of the findings in scientific research. By following the steps of the tool and using your creativity to brainstorm new ideas you will hopefully learn how to frame your message effectively.

Using the tool:

Before you can use the tool, you need to think about two important aspects of your content marketing; the marketing message you are going to consider and the target group. Once you've established these you can use the tool with to determine the barriers, learn how to overcome these barriers with influence mechanisms, apply their tactics to your message, and find out what tweaks can improve your message design.

Let's take this whole process step by step.

1. Preparation

STEP 1a- Define your goal

Take one 'message' from your marketing you want to discuss. This can be a flyer, a poster, a Facebook post, a page on your website, anything that contains a message for your target group to react on. Be as specific as possible.

Think about these questions:

- What is the goal of this element?
- What is the specific behaviour you want your target group to perform at this point?

STEP 1b- Define your target group

All your marketing is aimed at (potential) consumers. But who are these consumers? Think about what you know about them, how you measure their behaviour, and what do you with this information. Perhaps you want to address a new target group. Who are these potential consumers? Again, be as specific as possible.

Think about these questions:

- What do you know about who your target group is?
- Why would they be interested in your product, and why not?

Now is the moment to dive into the tool!

2. Tool time

STEP 2a- Identify barriers

Think about the target group you want to address and look at the barriers described in the tool. Determine which barriers are most important for your target group and why.

STEP 2b - Apply influence mechanisms

For each chosen barrier, look at the influence mechanisms provided to overcome this barrier. Refer to the booklet for more information, tactics and examples.

Now it's time to get creative!

Grab a piece of paper and for each tactic described in the booklet, think of one way to improve your message.

STEP 2c - Tweak the message design

Let's take your ideas one step further to an actual re-design. By now, you've identified barriers, learned about influence mechanisms and applied their tactics to your message. Lastly, it's time to see if there could be more design tweaks that you can apply to your ideas. Look at the suggested tweaks for each influence mechanism and try to think of a way to apply each tweak to your ideas. Feel free to use other design tweaks as well.

3. Designing your message

You've gained new insights in ways to influence your target group using their unconscious behaviour and simple framing tweaks. It's now time for you to develop your message, dive deeper into some of the mechanisms you find interesting, or test out some of your ideas.

Two last things to remember:

- Don't focus too much on providing information because most decision people make are not about the information but on their beliefs, the people around them, and their perception of their ability.
- There is no one size fits all, but by framing the message the right way using influence mechanisms you can change behaviour.

VI. MULTIPLE MODEL ANALYSIS

Main idea and model build-up

Key elements that change behaviour

Key constructs driving change

Cognitive vs emotional (type of determinants)

Practical guides

5A model of SRI decision (Pilaj)



Sustainable and Responsible Investment includes ethical values into the choosing of financial instruments

Combines financial and ethical criteria using choice architecture mechanisms to show why some nudges are effective and other forms of intervention are not

Consists of 5 mental steps (activation, awareness, attitude, action, adjustment) necessary for engaging in SRI, and states the corresponding barriers which need to be overcome

People need to be cognitively active

Change increases if barriers are perceived to be easy to overcome

There are three cognitive benefits for people; utilitarian (what can I buy for it?), emotional (how does it make me feel?), and expressive (what does it say about me?)

Main barriers for change:
 Activation (too many choices)
 Awareness (lack of knowledge at moment of choice)
 Attitude (we respond to interpretations of objectivity)
 Action (procrastination)
 Adjustment (value-action gap)

Knowledge

Context (resource availability)

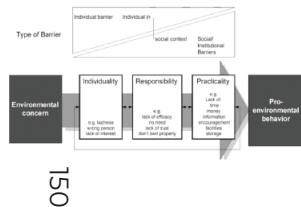
Cognitive (rational decision-making by information availability)

Change choice architecture:
 Reduce restraining forces rather than driving forces

Change default option (only if it reflects what most people would choose when adequately informed)

Make use of nudges to reduce cognitive dissonance (the devil is in the details)

Barriers for environmental action (Blake)



From concern to action people have to make a transition from overcoming personal barriers to overcoming external barriers

Barriers can occur over a spectrum of two variables: individual attitudes and external situational constraints

At environmental concern the individual barriers are the main constraint, and approaching the action phase external barriers become the limiting factor

Categories of obstacles are individuality (attitudes and cognitive structure), responsibility (evaluation of personal consequences) and practicality (non-mental constraints)

A higher feeling of efficacy increases our positive attitudes

When individual barriers are overcome, responsibility barrier come next, and are followed by practical barriers

Being socially supported increases motivation because the person does not feel alone

Being socially supported and feeling physically capable increases efficacy

By making people feel empowered they are more likely to perceive external barriers as lower

Personality (norms, beliefs)

Attitudes (efficacy level, trust)

Context (situational constraints)

Emotional (beliefs and interests)

Emotional (level of social support)

Cognitive (external constraints and possibilities)

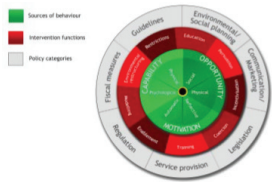
Take away practical/context barriers (such as lack of facilities, information, encouragement)

Use social surrounding to increase efficacy

Build trust through addressing their individual capabilities

Invest in democratic governance (bottom-up initiatives) to allow participants more access to resources (increasing feelings of efficacy)

Behaviour change wheel (Michie)



Uses behaviour theories to determine what needs to change for a behavioural target to be achieved and what interventions are likely to be effective

Behaviour change interventions are coordinated sets of activities designed to change specified behaviour patterns

The three interventions for behaviour change are: capability (physical and psychological), motivation (automatic and reflective), and opportunity (social and physical)

The interventions serve purpose for one of nine functions: education, persuasion, incentivisation, coercion, training, enablement, modeling, environmental restructuring, and restrictions

Intervention mapping through context acknowledgment and theory based psychological information gives the best range of options

Behaviour in context is the starting point of intervention design

Not all intervention functions and policy measures are suitable for each intervention category

Capability (physical, psychological)

Motivation (cognitive, emotional)

Context (social, practical)

Emotional (perceived efficacy)

Emotional (social influence)

Cognitive (reflection on knowledge and capabilities)

Context (opportunities)

Look at the context to determine the situational determinants that need to be addressed, and from here out look at the individual mental aspects that can affect this

Integrate the context with intrinsic behaviour

Know which interventions you want to change and then look at the functions that can achieve this. These functions can then be supported by policy measures

Communication Persuasion matrix (McGuire)

INFLU: Independent variables		Source	Message content	Channel	Receiver	Response Target
OUTCOME: Dependent variables	1. Exposure to the communication					
	2. Attention					
	3. Comprehension					
	4. Agreement (attitude change)					
	5. Intentional behavior					
	6. Decision making / intention					
* Outcome: yielding to second world decision						

Trans-theoretical model of change (prochaska)

Using input (columns) from independent variables and using dependent variables as output (rows) to see how effective these are affected by inputs

Inputs are: source (credibility, attractiveness, power, number/unanimity), message (style, type of appeal, information, inclusion/omissions, organization, repetition), channel (sensory modalities, direct/mediated, verbal/nonverbal, context), receiver (participation, demographics, personality, abilities), and destination (knowledge/attitudes/action, immediate/delayed, change/resistance)

Outputs are: Exposure, attendance, liking/interest, comprehension, skill acquisition, yielding, retention to change, search of new attitude, decision after search, behaviour, reinforcement, postbehavioural consolidation)

A step wise approach from liking to changing attitude of changing behaviour through well planned message delivery

The matrix functions as a checklist of possible resources out of which effective communications can be constructed depending on where the receivers is at the point of design

Knowledge (awareness and interest)

Capabilities (acquiring skill)

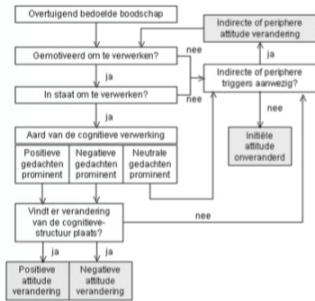
Attitude (motivation to change)

Cognitive (leaning through information/skill building)

Invest in each step to get the right change and know per step on what input to focus on

When designing message look at all the elements (style, type of appeal, information, inclusion/omissions, organization, repetition) listed and reflect on their possible effects on the receiver

Elaboration likelihood model (Petty & Cacioppo)



Information processing theory showing that persuasion always happened at either of two routes, the central or peripheral mental levels

General framework for arranging, categorizing and understanding process that underlie how effective persuasive communications are

The framework takes stepwise approach through questions towards simple answers for intervention design

The more deliberate the change, the more likely the new attitude is to stay and to resist counter persuasion

(motivation vs ability) x (situation vs person) x (extent vs direction of thinking) = level of message processing

Other influencers are perception of attitude of others, self-efficacy, competence and prior behaviour and habits

Attitudes are influenced in part by both processes

When the message content is relevant, central route is often followed

People analyse messages according to their consequences

Motivation (willing to process information, cognitive)

Capabilities (for mental change, cognitive)

Knowledge (understanding the issue)

Cognitive (central route)
Cognitive (willingness, positive/negative thought development, competence)

Emotional (peripheral route)

Emotional (attitudes are steered by others, feelings of efficacy)

Find out at which route the current opinion was formed to know which route you want to address for next attitude change

Relevant message = central route
Irrelevant message = influence comes from salient expertise cue

Inform people of the decision possibilities to change from negative to positive perception

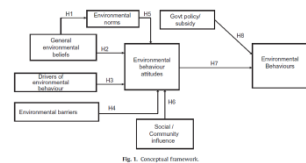
Think about the mood of people

Framework based on the Theory of Planned Behaviour, but focus-sing on people's existing intrinsic attitudes and perceptions

A person's environmental behaviour is influenced by his attitudes and government policy/subsidies. These attitudes are influenced by norms, beliefs, driver, barriers and community influence

Framework shows that some beliefs and attitudes do directly influence environmental behaviour

Environmental Behaviour Framework (Gadenne)



Intrinsic, extrinsic, social norms, community influence change environmental attitudes

Cost is the main barrier

Only when environmental norms on price are correlated to environmental attitudes will they affect environmental prices

Factors influencing behaviour are feelings of high importance, guilt, moral obligation, responsibility, ease of adoption and personal relevance.

Behavioural achievement depends on motivation (intention) and ability (behavioural control)

Motivation (by knowing drivers that overcome barriers)

Norms and beliefs (of environmental relevance/necessity)

Context (social/community influence)

Context (government/financial support)

Cognitive (norms and motivational drivers)

Emotional (environmental and social norms)

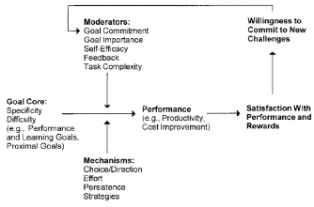
Context (Social norms)

Motivate through guilt, moral obligation, social responsibility, moral beliefs, ease of adoption and personal relevance

Take away barriers

Offer policy measures or financial incentives

Goal-setting Theory (Locke & Latham)



Focus is on the core properties of an effective goal: specificity/difficulty, the effect of the goal, the use of learning versus performance, the mediators and the effect.

A goal is the object or aim of an action, for example, to attain a specific standard of proficiency, usually within a specified time limit. It serves as the inflection point for satisfaction vs dissatisfaction

Goals are directive, energizing, affect persistence, and lead to arousal and discovery

Moderator to achieve goals are: commitment, importance, self-efficacy, feedback, and complexity

Goal specificity does not necessarily lead to high performance, but it reduces variation in performance due to ambiguity about what is to be achieved

Self-efficacy is important because goals will be higher, commitment is higher and response to feedback is more positive.

To get from a goal to a performance self-efficacy and a personal goal (motivation) are both needed

Setting a high goal neutralizes goal orientation effects

Commitment is most important when goals are difficult

People can act without knowing what is motivating them, but Irrespective of subconscious, conscious motivation affects performance and job satisfaction

Motivation (by cognitive impulses through learning of performance measures)

Capabilities (setting goals to increase learning)

Cognitive (through decided goals)

For complex tasks, set learning goals

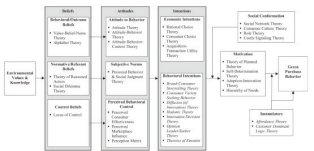
For easy tasks, set performance goals

Praise performance

Easy perception and ability to persist (self-efficacy and capabilities)

Use conscious priming as tool for difficult goals

Green consumerism (Groening)



Provides avenues for future research using existing theories that researchers could use to help explain individual consumer green purchasing behaviour

Prior consumption decision making distinguishes several theory groupings: values and knowledge, beliefs, attitudes, intentions, motivations, and social confirmation

Knowledge and values are the basis

For beliefs to turn into attitudes which form intentions, motivation is needed.

These intentions are influenced by motivation, social confirmation and external facilitators

Subjective knowledge generated by beliefs and values play the greatest role in predicting green purchase behaviour

After having the intention social influence can still inhibit behaviour change from taking place

Norms and beliefs (values, social norms, and self-efficacy)

Attitudes (based on intentions due to norms and beliefs)

Intentions (guided by motivation)

Motivation (combination of inter- and intra-individual characteristics influenced by social norms)

Cognitive (values and knowledge)

Cognitive (efficacy and capabilities)
Emotional (beliefs, motivation)

Context (effects after determination of attitude)

Identify at which stage change needs to start and apply designated theory

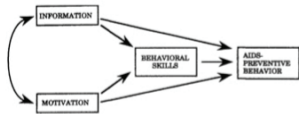
Determine level of altruism and differences in beliefs

Look for positive halo effects of green products (eg. sales increase, performance perception)

Prevent social influence from becoming a barrier after developing intention

First increase knowledge, then increase efficacy and then increase motivation

Information-motivation-behaviour (Fisher)



Information, motivation are key constructs that influence behaviour skills, and which then altogether influence behaviour

This first phase is the elicitation step (seeking interest), followed by intervention design (promote skills) and then evaluation (measure effect)

Information, motivation and behavioural skills are fundamental determinants of performance behaviour.

Information directly influences performance by spreading simple facts as relevant heuristics to direct out attention

Motivation make us feel inclined to act, and can be either from a personal or social perspective

Feeling capable of performing a behaviour easily increases motivation

Motivation (based on information and efficacy)

Cognitive (knowledge to be motivated to act)

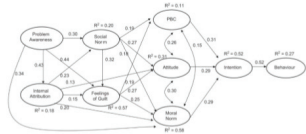
Cognitive (having high efficacy to act)

Inform receiver on desired behaviour

Increase motivation by showing how little barriers there are

Highlight skills already available and for those required, make them perceivable as easy to obtain

Integrative model (Bamberg & Möser)



The integrative model based of the Theory of Planned Behaviour includes pro-environmental be-haviour by showing that pro-environmental behaviour is best viewed as a mixture of self-interest and pro-social motives

Moral norms are presented as an individual factor and are determined by cognitive, emotional and social factors

Attitudes, behavioural control and personal norms are predictors of pro-environmental behaviour intention

Awareness is only an indirect indicator

Initiated by awareness, social norms, internal attribution and guilt three elements change intentions: PBC, attitude and moral norm

Moral norms (influenced social influence, guilts, awareness)

Attitudes (determined by motivation through guilt or social pressure)

Efficacy (perceived control, determined by norms and guilt)

Moral norms (influenced social influence, guilts, awareness)

Attitudes (determined by motivation through guilt or social pressure)

Efficacy (perceived control, determined by norms and guilt)

Cognitive (social pressure, efficacy and guilt)

Emotional (moral norm and guilt)

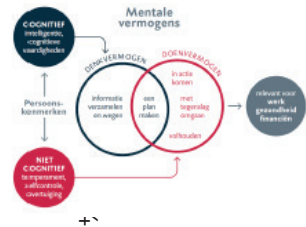
Integrate self-interest and pro-social motives

Focus on affecting the social norms because they also affect the moral norms

Increase guilt because in highlights obligation

Increase feeling of efficacy by highlighting the responsibility

Mental capabilities (WWR)



People their ability to make choices is dependent on their thinkability (mental capacity) and their doability (capability).

Capability is determined by temper, self-control and conviction.

Self-control is affected by stress and pressure

Knowing does not necessarily lead to doing

Less stress and choice eases behaviour change

People their personality (approach/avoidance traits) influences their capability to act and their vision towards change (optimistic/pessimistic)

Self-control is essential for deliberate behaviour change

Capabilities (personality influences efficacy to act)

Personality (level of temper, mental constraint and optimism)

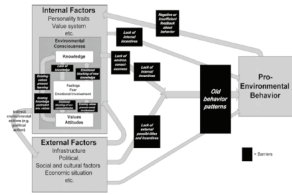
Emotional (personality, mental constraint)

Be wary of generic interventions, but experiment with smaller non-cognitive capability solutions

Adjust choice architecture through changing default options and limit choices

Seek for personal contact with the receivers Always handle at personal level, keeping in mind the mental state of the receiver

Model of pro-environmental behaviour (Kollmuss & Agyeman)



The biggest positive influence on pro-environmental behaviour is achieved when internal factors (personality traits, values, knowledge, attitudes) and external factors (infrastructure, political/social/cultural factors, economic situation) act synergistically.

Old habits form one of the strongest barriers together with lack of supporting motivations/knowledge/skills

80% of the motives for pro-environmental behaviour are situational factors, 20% is internal

Increase of knowledge, positive emotions and values provokes the best internal situation.

Facilitation of support by external environment needs to be in place for successful behaviour

Behavioural beliefs concerning consequences and normative beliefs concerning prescriptions of others are main determinants for changing behaviour

Knowledge (environmental consciousness)

Context (infrastructure, policy, social and economic situation)

Motivation (taking away barriers)

Cognitive (knowledge and incentives)

Emotional (barriers and efficacy)

Context (necessary infrastructure/policy needs to be in place)

Take away practical barriers

Aim to decrease emotional perception of barriers to increase incentives

Overcome old habits by increasing internal incentive, environmental consciousness and external possibilities

Make sure the desired behaviour lies close to their attitude on environmental behaviour

Persuasion (Cialdini)



The six basic tendencies for human behaviour when wanting to generate positive response are: reciprocation, consistency, social validation, liking, authority and scarcity

People are inclined to favour and to comply with those whom they like

People don't want to be tricked into something, but we do like to be informed into saying yes

In trying to persuade only attain to genuine expertise, accurate social validation, real similarities, useful favours, legitimate scarcity and existing commitments

Most behaviour change can be steered unconsciously

Reciprocation (we feel obligated to repay others for what we have received)

Consistency (we want to stick to our habits and what we say)

Scarcity (we want what's in short supply)

Social validation (others determine how we should behave)

Authority (we easily rely on those who 'know better')

Personality (addressing consistency and scarcity)

Context (people are influenced by their peers)

Emotional (unconscious effects within each type of tendency)

Pick one or more out of these tendencies to get unconscious change/effects

Reciprocation (show that you are making an extra effort, Overton window)

Consistency (let receiver make public commitments)

Scarcity (aim for limited opportunities for the receiver)

Social validation (show what others are doing to stimulate similar behaviour)

Authority (make the message come from an authoritarian Figure)

Make use of the Overton window to change perspective

Predictors of environmental behaviour (Hines et al.)



Responsible behaviour is determined by the following variables: (knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, and individual sense of responsibility)

The model also points out the situational factors (economic constraints, social pressures, choosing opportunities) that influence actions

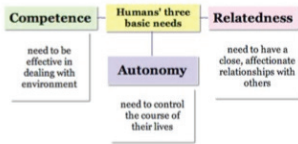
Attitudes, locus of control and values/ beliefs influence personality factors, and that together with knowledge leads to intention, but situational factors need to be considered before coming to a potential behaviour change prediction

Knowledge (of issues)
 Personality (control, responsibility and attitudes)
 Context (situational factors)

Cognitive (Knowledge)
 Cognitive (Efficacy, consequences of behaviour)
 Context (situational factors)

Be aware of the belief influencing personal factors.
 Try in increase knowledge.
 Know the influence of situational factors to predict behaviour change.

Self-determination theory (Ryan & Deci)



Approach to human motivation and personality that uses traditional empirical methods while employing an organismic meta theory that highlights the importance of humans evolved inner resources for personality development and behavioural self-regulation

We need to feel like we have competence to act, be autonomous in our acting and feel related in our actions to others to change our behaviour

Capabilities (efficacy to act and having control)
 Context (social relatedness)

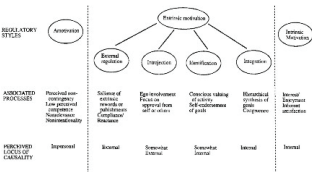
Cognitive (being capable of acting)
 Cognitive (social acceptance)
 Emotional (efficacy in competence and control)

Make sure people feel they have control over their choices
 Take away barriers that hinder capabilities to act
 Increase feelings of social acceptations

There are three basic human needs for acting: competence (need to be effective in dealing with environment), autonomy (need to control the course of our lives), relatedness (need to have relationships with others)

Addressing these three elements increased motivation to act

Organismic Integration Theory (Ryan & Deci)



Shows the different form of extrinsic motivation and the contextual factors that either promote of hinder internalization and integration of the regulation for these behaviours

People change easier when intrinsic motivation is increases, supported by extrinsic pressure, but this extrinsic pressure is supported by feeling of relatedness and competence

Personality (starting point for motivation)
 Capabilities (control over motivation)
 Context (later stage influencers/ inhibitors to motivation)

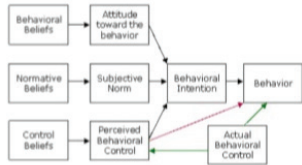
Cognitive (motivation by external influences)
 Emotional (intrinsic motivation)
 Intrinsic (motivation), but in combination with external influences

Focus on the more intrinsic motivation, because extrinsic motivators arise from a need to relatedness, which is more important that the external stimuli
 Focus on relatedness, autonomy and efficacy
 People need to change their goals and values. To facilitate this, give them a sense of choice, volition, and freedom from excessive external pressure towards behaving a certain way

The continuum moves from amotivation (non-regulation), to extrinsic motivation (external regulation, to internal regulation), to intrinsic (fully internal regulation)

Social context influences the intrinsic motivation greatly

Theory of Planned Behaviour (Ajzen)



Theory designed to predict and explain human behaviour in specific contexts

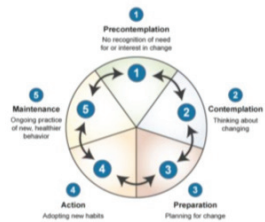
Central is the intention, and this intention to perform behaviours can be predicted from attitudes, which are formed by norms, behavioural control, and attitudes.

Cognitive self-regulation plays an important part

Hedonistic model assuming people are motivated to avoid punishment and to seek rewards (Bamberg)

It is at the level of beliefs that we can learn about the unique factors that induce one person to engage in the behaviour of interest and to prompt another to follow a different course of action

Transtheoretical stages of change (Prochaska & DiClemente)



Involves 10 processes of change (consciousness raising, self-liberation, social liberation, self-reevaluation, environmental reevaluation, counterconditioning, stimulus control, reinforcement management, dramatic relief, helping relationships) receiving differential application during the 5 stages of change (precontemplation, contemplation, action, maintenance, relapse)

During each phase, different behavioural change receptors are active

Situational constraints determine the behaviour in different situations

Behavioural achievement depends jointly on motivation (intention) and ability (behavioural control)

Individual control highly influences attitudes, intention, and directly the predictions of behaviour

Perceived behavioural control can be used to substitute actual control

Intervening events may change intentions in a way that original measures of behaviour predictions are no longer accurate

A cognitive/affective reevaluation process carries contemplation to action phase.

Counterconditioning and stimulus control bridge action and maintenance

Precontemplators process less information and spend less time reevaluating themselves. What moves then into serious contemplating is not clear, but they are likely to respond to feedback and education

Beliefs (in behaviour, social norms, and control)

Motivation (intention to behave according to belief or social norm)

Capabilities (perceived versus actual control)

Context (any sample of behaviour reflects factor unique to the situation)

Knowledge (information provision can create motivation to interest in changing)

Cognitive (beliefs and norms based on rational choice)

Cognitive (actual behavioural control and motivation)

Cognitive (social norms)

Emotional (perceived behavioural control)

Cognitive (rational evaluation)

Focus on perceived control over actual control because it can have a larger effect

Design for intervening events to change individual measurement of other variables

Focus on self-interest (Bamberg), because it over-shadows social pressure

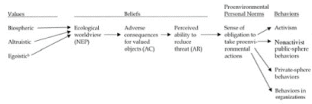
Change belief because they form the norms that steer intention

Know at what stages of change the receiver is and then choose the right process of change

Provide information and feedback during contemplation

Focus on counterconditioning during contemplating phase

Value-belief-norm theory of Environmentalism (Stern)



Pro-environmental actions occur in response to personal moral norms about such actions. These are activated in individuals who believe that environmental conditions pose threats to other people/species/biosphere and that actions they initiate could avert those consequences

Personal pro-environmental norms (the belief that the individual and other social actors have an obligation to alleviate environmental problems) is common in all types of environmentalism

Value-belief-norm theory is based on values, then moves to awareness, then to feelings of responsibility, and then to changing personal norm possibly leading towards behaviour change

Behaviour is supported by private sphere, policy support and environmental citizenship

The more a person feels his beliefs will be accepted the more likely he is to act

Norm-based actions flow from acceptance of personal values, beliefs that values are under threat, and beliefs that actions can restore values
Egoistic orientation + Social orientation + Biospheric orientation (Kollmuss) = Motivation

Motivation (dependent on self, social and environmental orientation)

Context (social support to create inertia)

Cognitive (self-evaluation and threat determination)

Emotional (intrinsic values)

Emotional (threats and efficacy to act)

Support environmental beliefs and stimulate social acceptance

Follow these steps: use different interventions to take away limiting factors, understand receivers' situation, apply psychological tools to overcome barriers, address conditions beyond personal constraints, set realistic expectations, monitor, stay within bound or actors' tolerance, be participatory.

Increase normative beliefs through promoting responsibility (Gadenne)

Focus on pro-socially motivated, not self-interest. (Bamberg)

Make people feel empowered to act

VII. BARRIER IDENTIFICATION

	Dragons of inaction (Gifford)	S. Melchoir	G. Slob	A. Visser	R. van Breda	M. Handgraaf	P. Hovestadt	Total
Limited Cognition								5
	Ancient brain							2
	Ignorance							5
	Environmental numbness							1
	Uncertainty							5
	Judgmental discounting							3
	Optimism bias							0
	Perceived behavioural control							4
Ideologies								0
	Worldviews							1
	Suprahuman powers							1
	Techno salvation							0
	System justification							3
Comparison with others								6
	Social comparison							4
	Social norms and networks							4
	Perceived inequity							1
Sunk costs								2
	Financial investments							2
	Behavioural momentum							0
	Conflicting values							3
Discredence								1
	Mistrust							5
	Perceived performance inadequacy							2
	Denial							2
	Reactance							3
Perceived risks								0
	Functional							4
	Physical							1
	Financial							1
	Social							1
	Psychological							1
	Temporal							3
Limited behaviour								0
	Tokenism							1
	Rebound effect							1

VIII. INFLUENCE MECHANISMS

INFLUENCE MECHANISMS AT ATTITUDE LEVEL (ADAPTED FROM MULTIPLE SOURCES)

Influence Mechanism	Explanation	Theoretical confirmation	Confirmation by expert
Information increase	Environmental knowledge and beliefs are the starting point to change attitudes and intentions; without awareness there is no basis for change; the more thoughtful the change, the more likely it is to persist	(Ajzen, 2002; Bamberg & Möser, 2007; Fisher, Fisher, & Harman, 2003; Groening et al., 2018; Petty & Cacioppo, 1986; Stern et al., 1999)	G. Slob, R. van Breda, P. Hovestadt
Emotional steering	People tend to stick to their beliefs regardless of the correctness, but their mood can influence their receptiveness for a message; people want to avoid feelings of pain and discomfort and are positively influenced by warm memories or surprise effects	(Ajzen, 2011; Blake, 1999; Kollmuss & Agyeman, 2002; Lakoff, 2010; Petty & Cacioppo, 1986; Pratkanis, 2007; Sleenhoff, 2016; Zhai et al., 2014)	S. Melchior, S. Gagestein, R. van Breda, P. Hovestadt
Attention points	People remember the first and last thing they see; Adding an extra decision point ensures maintenance of attention; focusing on the next attention point eases continuation;	(Druckman, 2001; Pratkanis, 2007)	S. Gagestein, G. Slob, A. Visser
Storytelling	People relate more to stories than to information; creating mental images increases identification, engagement and memory; relatable metaphors steer opinion formation	(Gressgård, 2015; Groening et al., 2018; Pratkanis, 2007)	S. Gagestein, A. Visser
Scarcity	People are loss averse and will try to avoid them even if choice is risky; they are more likely to purchase something if it is in short supply; exclusive information is more persuasive; creating urgency increase the change of loss	(Cialdini & Goldstein, 2002; Houde & Todd, 2010; Pratkanis, 2007; Thaler & Sunstein, 2008)	J. Mes
Self-interest	A message becomes more important if it seem personally relevant; people seek constant personal gain; personal motives (eg. comfort) override responsible motives (eg. Environmental values); desired behaviour should lie close to current attitude	(Bamberg & Möser, 2007; Gadenne et al., 2011; Kollmuss & Agyeman, 2002; Petty & Cacioppo, 1986; Pratkanis, 2007; Ryan & Deci, 2000)	S. Melchior, M. Handgraaf, P. Hovestadt
Guilt and responsibility	People feel more inclined to act when they are pointed out their responsibility; guilt stimulates a felt obligation to compensate for the damage caused; responsibility and guilt affect people's identity which they rather not have damaged	(Bamberg & Möser, 2007; Gadenne et al., 2011; Zhai et al., 2014)	

INFLUENCE MECHANISMS AT SOCIAL NORM LEVEL (ADAPTED FROM MULTIPLE SOURCES)

Influence Mechanism	Explanation	Theoretical confirmation	Confirmation by expert
Public commitments	Having made a public commitment makes people feel the need to act consistently and remain to support it later; a desire to keep a public goal is greater than a private goal because of possible identity damage if they don't stick to it; verbal commitment increased willingness to comply	(Cialdini & Schultz, 2004; Gadenne et al., 2011; Kollmuss & Agyeman, 2002; Locke & Latham, 2002; Pratkanis, 2007)	S. Melchior, G. Slob, A. Visser
Social norms	Social norms develop moral norms because they set standards on what seems appropriate;	(Bamberg & Möser, 2007; Stern et al., 1999; Thaler & Sunstein, 2008)	S. Melchior, G. Slob, A. Visser, R. van Breda, M. Handgraaf
Reciprocity	People feel the intrinsic tendency to comply with those that are close to us or return to those that has offered us a gift; giving an unexpected gift increases gratitude; adding an extremer alternative makes the desired option more desirable	(Cialdini & Goldstein, 2002; Houde & Todd, 2010)	P. Hovestadt
Trust	People trust a messenger more when it feels genuine and there's a shared goal;	(Blake, 1999; Gifford, 2013; Gottweis, 2005; Reeves, 2006)	R. van Breda, M. Handgraaf
Role-model or authority	People tend to follow an authority message of Figure when uncertain; showing honest expert opinion increased reliability	(Blake, 1999; Cialdini & Goldstein, 2002; Pratkanis, 2007)	S. Gagestein, P. Hovestadt
Personal contact	Early personal contact prevents a wrong mental decision process from occurring; people are more susceptible to information spread through personal contact; people tend to follow their community leaders without careful consideration	(Locke & Latham, 2002; Reeves, 2006; Ryan & Deci, 2000; WWR, 2017; Zhai et al., 2014)	M. Handgraaf
Social ranking	People determine the quality of their behaviour compared to others; when they are (publicly) ranked to their peers there are more likely to change;	(Cialdini & Goldstein, 2002; Pratkanis, 2007; Schubert, 2017; Schwartz, 1977; Seebauer, Fleiß, & Schweighart, 2017)	S. Melchior, M. Handgraaf

INFLUENCE MECHANISMS AT EFFICACY LEVEL (ADAPTED FROM MULTIPLE SOURCES)

Influence mechanism	Explanation	Theoretical confirmation	Confirmation by expert
Autonomy	Feelings of autonomy increases intrinsic motivation; personal encouragement and training increases personal skills and feelings of ability; people are open to change their values if they feel free from external pressure in choosing	(Bamberg & Möser, 2007; Locke & Latham, 2002; Pratkanis, 2007; Ryan & Deci, 2000)	S. Melchior, G. Slob, R. van Breda, M. Handgraaf
Goal-setting	Setting goals brings a distant problem closer by breaking it up; setting goals stimulate usage of knowledge and skills; goals should be realistic and reflected upon frequently; for easy task	(Locke & Latham, 2006; Stern et al., 1999)	R. van Breda, P. Hovestadt
Guarantees	Offering free trials decreased threshold to change behaviour; once people have ownership over something they do not want to let it go	(Kahneman, 2011; Pratkanis, 2007)	R. van Breda, M. Handgraaf
Empowerment	People experience higher feelings of efficacy when they are engaged in the change; if a person's unique skill is highlighted they feel more personally inclined to participate	(Ajzen, 2002; Blake, 1999; Fisher et al., 2003; Pratkanis, 2007)	G. Slob, R. van Breda
Feedback	Showing people that their actions have effect increased behaviour maintenance; so do reward during the process; feedback serves as a new reference standard for reevaluation; people prefer rewards over punishment; praise performance directly	(Bamberg & Möser, 2007; Blake, 1999; Locke & Latham, 2002; Prochaska, Diclemente, & Norcross, 1993)	S. Melchior
Practical facilitation	People follow the path of least resistance so taking away physical and mental barrier lowers the threshold to comply; the fewer practical boundaries the less additional stimulus people need; reducing restraining forces is a better enabler than driving forces	(Blake, 1999; Gadenne et al., 2011; Kollmuss & Agyeman, 2002; Pilaj, 2017; Pratkanis, 2007; Stern et al., 1999)	S. Melchior, S. Gagestein, R. van Breda, M. Handgraaf, P. Hovestadt
Choice architecture	People base decision on what is readily available in their brain; by presetting the decision criteria people can be steering in their opinion formation; a reduction in mental load prevents inaction; people often choose the path of least resistance so setting the default can change their opinion	(Druckman & Mcdermott, 2016; Houde & Todd, 2010; Pilaj, 2017; Pratkanis, 2007; Thaler & Sunstein, 2008; WRR, 2014)	S. Gagestein, G. Slob, A. Visser, R. van Breda, M. Handgraaf

IX. DESIGN TWEAKS

Experience component	Design tweaks		Source
	Content		
Semantics	1.	Use clear and short headings	(Middendorf, 2012; Weinschenk, 2011)
Emotional	2.	Use familiar and easy words and phrases	(Middendorf, 2012)
Semantics	3.	Present maximum four items at the same time, or maximum 9 if you cluster them	(Jones, 2002; Weinschenk, 2011)
Emotional	4.	Use anecdotes and emotion through storytelling	(Weinschenk, 2011)
Semantics	5.	Present information in steps or with action plans	(Weinschenk, 2011)
Emotional	6.	Surprise the consumer by offering something new or keeping them curious	(Middendorf, 2012; van der Stigchel, 2016; Weinschenk, 2011)
Emotional	7.	Link to existing belief and refer to familiar designs	(van der Stigchel, 2016; Weinschenk, 2011)
Emotional	8.	Show praise and give rewards if desired behaviour is performed	(Weinschenk, 2011)
Emotional	9.	Use story editing by slightly changing their current behaviour and opinion	(Weinschenk, 2016)
Emotional	10.	Acknowledge your small weaknesses to then highlight your strength	(Pratkanis, 2007)
	Text		
Aesthetics	11.	Use clear fonts for high speeds reading and decorative fonts for attention	(Weinschenk, 2011, 2016)
Semantics	12.	Use short line lengths and multiple columns for easy and quick reading	(Weinschenk, 2011)
Semantics	13.	Present bite sized chunks to make the message stick	(Weinschenk, 2011)
Emotional	14.	Use nouns such as “be a donor” over verbs such as “donate now”	(Weinschenk, 2016)
Semantics	15.	Simplify	(Middendorf, 2012; Weinschenk, 2011)
Emotional	16.	Think of effects and meaning each word	
Semantics	17.	Present text in bullet points, sequences, or action plans for overview	(Middendorf, 2012; Weinschenk, 2011)
Aesthetics	18.	Present information about injunctive norms visually and use numbers	(Weinschenk, 2011)
Emotional	19.	Be transparent about your aim and state conclusion	(Pratkanis, 2007)
Emotional	20.	Use clear metaphors and analogies	(Weinschenk, 2011)
	Layout		
Semantics	21.	Emphasize shortcuts by speaking to unconscious mental shortcuts	(Middendorf, 2012; Weinschenk, 2011)
Aesthetics	22.	Use symmetry	(Weinschenk, 2016)

Aesthetics	23.	Place the main message central and keep the border clean for better overview	(Weinschenk, 2011)
Emotional	24.	Use familiarity and focus on expectation to guide the user	(Middendorf, 2012; van der Stigchel, 2016)
Semantics	25.	People first look left at the top, then to right and then down	(Middendorf, 2012)
Aesthetics	26.	Place the next step close to the current step	(Middendorf, 2012; Weinschenk, 2011)
Semantics	27.	Use grids to clear separation to create overview	(Middendorf, 2012)
Aesthetics	28.	Use blanc space to keep the focus on the right message	(Middendorf, 2012; Weinschenk, 2011)
Semantics	29.	Cluster information together to help categorize	(Middendorf, 2012; Weinschenk, 2011)
Semantics	30.	Only present the relevant information, too much information is distracting	(van der Stigchel, 2016; Weinschenk, 2011)

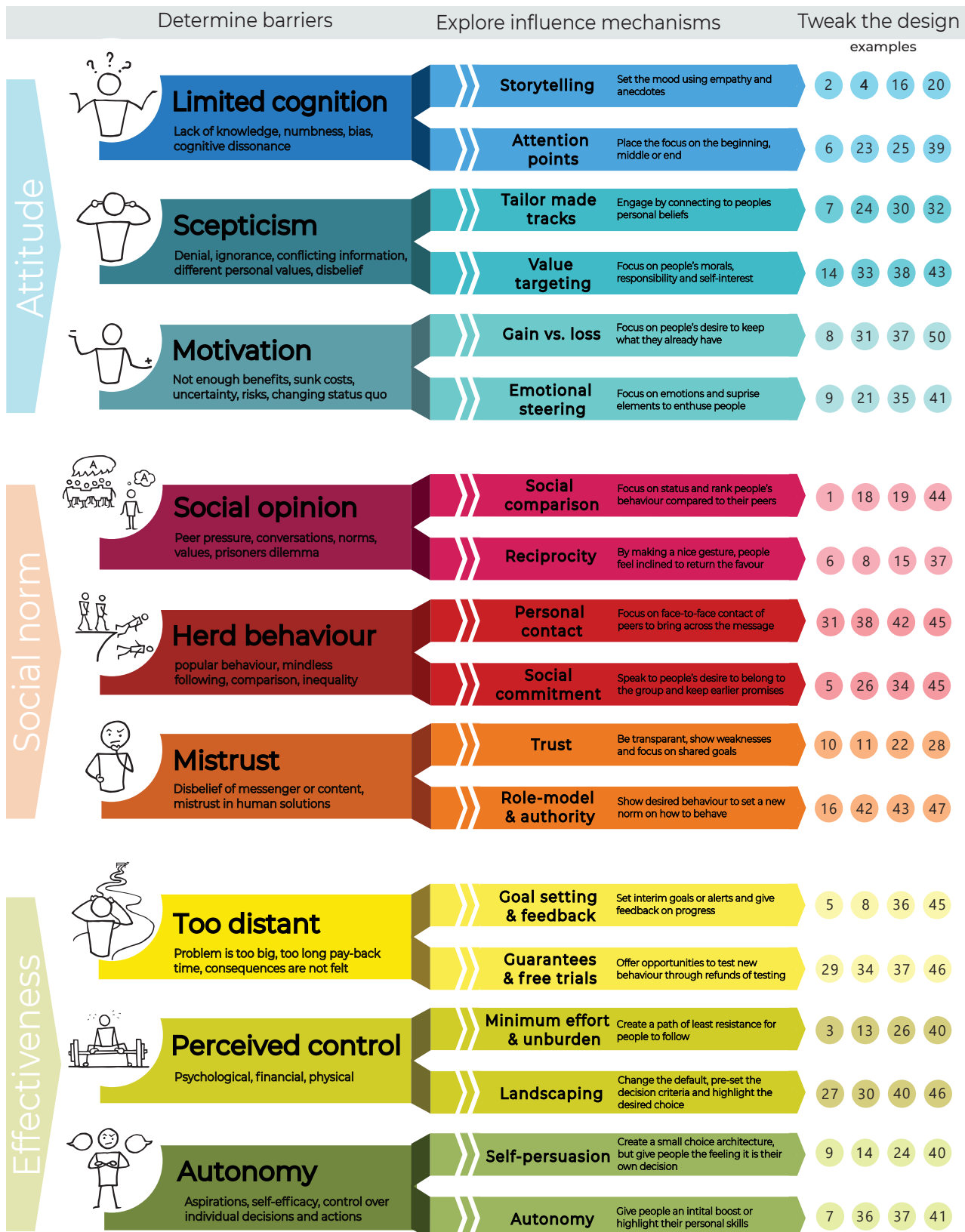
Call to action

Emotional	31.	Play into the expectation and perception of the user	(Hermsen & Renes, 2014; Weinschenk, 2016)
Emotional	32.	Use images showing positive moods and happy feelings	(Weinschenk, 2011, 2016)
Aesthetics	33.	Highlight the next step, send alert or reminders	(Weinschenk, 2011)
Emotional	34.	Make each click a small commitment	(Weinschenk, 2011)
Emotional	35.	Don't present all the information at once to make people curious	(Weinschenk, 2011)
Aesthetics	36.	Show that people can click on information or use buttons to indicate action	(Middendorf, 2012)
Emotional	37.	Give the consumer and initial boost	
Emotional	38.	Use arrows of role models (in pictures) to show where to look next	(Middendorf, 2012; van der Stigchel, 2016; Weinschenk, 2016)
Semantics	39.	Visualize how far along in the process the user is and make the end salient	(Middendorf, 2012; Weinschenk, 2011)
Aesthetics	40.	Make the default option look most attractive	(Hermsen & Renes, 2014)

Imagery

Aesthetics	41.	Focus on attractive images and positive moods	(Weinschenk, 2011)
Emotional	42.	Show role-model or images performing the desired behaviour	(Hermsen & Renes, 2014; Weinschenk, 2011, 2016)
Emotional	43.	Use people with micro-expressions to trigger the same emotion	(Middendorf, 2012; Weinschenk, 2011)
Aesthetics	44.	Use icons & symbols to ease information	(Weinschenk, 2016)
Aesthetics	45.	Use curves & arrows to guide the user	(Middendorf, 2012; Weinschenk, 2016)
Aesthetics	46.	Exaggerate element by encapsulation, changing shapes or different sizes	(Hermsen & Renes, 2014; Middendorf, 2012; van der Stigchel, 2016)
Semantics	47.	Use recognizable images	(Weinschenk, 2011)
Aesthetics	48.	Think of the effects of colours and sounds	(Middendorf, 2012; van der Stigchel, 2016; Weinschenk, 2011)
Aesthetics	49.	Be consistent in colour use to link elements together	(Middendorf, 2012; van der Stigchel, 2016)
Emotional	50.	Use humorous nudges or priming techniques	(Sunstein, 2014; Thaler & Sunstein, 2008)

CU-change tool



Using the tool

Introduction to the tool:

The main function of the tool is to give you more insights in behaviour change mechanisms and tweaks that can help improve your content marketing. It is a compilation of some of the findings in scientific research. By following the steps of the tool and using your creativity to brainstorm new ideas you will hopefully learn how to frame your message effectively.

Using the tool:

Before you can use the tool, you need to think about two important aspects of your content marketing; the marketing message you are going to consider and the target group. Once you've established these you can use the tool with to determine the barriers, learn how to overcome these barriers with influence mechanisms, apply their tactics to your message, and find out what tweaks can improve your message design.

Let's take this whole process step by step.

1. Preparation

STEP 1a- Define your goal

Take one 'message' from your marketing you want to discuss. This can be a flyer, a poster, a Facebook post, a page on your website, anything that contains a message for your target group to react on. Be as specific as possible.

Think about these questions:

- What is the goal of this element?
- What is the specific behaviour you want your target group to perform at this point?

STEP 1b- Define your target group

All your marketing is aimed at (potential) consumers. But who are these consumers? Think about what you know about them, how you measure their behaviour, and what do you with this information. Perhaps you want to address a new target group. Who are these potential consumers? Again, be as specific as possible.

Think about these questions:

- What do you know about who your target group is?
- Why would they be interested in your product, and why not?

Now is the moment to dive into the tool!

2. Tool time

STEP 2a- Identify barriers

Think about the target group you want to address and look at the barriers described in the tool. Determine which barriers are most important for you target group and why.

STEP 2b - Apply influence mechanisms

For each chosen barrier, look at the influence mechanisms provided to overcome this barrier. Refer to the booklet for more information, tactics and examples.

Now it's time to get creative!

Grab a piece of paper and for each tactic described in the booklet, think of one way to improve your message.

STEP 2c - Tweak the message design

Let's take your ideas one step further to an actual re-design. By now, you've identified barriers, learned about influence mechanisms and applied their tactics to your message. Lastly, it's time to see if there could be more design tweaks that you can apply to your ideas. Look at the suggested tweaks for each influence mechanisms and try to think of a way to apply each tweak to your ideas. Feel free to use other design tweaks as well.

3. Designing your message

You've gained new insights in ways to influence your target group using their unconscious behaviour and simple framing tweaks. It's now time for you to develop your message, dive deeper into some of the mechanisms you find interesting, or test out some of your ideas.

Two last things to remember:

- Don't focus too much on providing information because most decision people make are not about the information but on their beliefs, the people around them, and their perception of their ability.
- There no one size fits all, but by framing the message the right way using influence mechanisms you can change behaviour.

Attitude

Limited cognition



A lack of knowledge, or an overload of information can lead to incorrect assessment or numbness. It is difficult for the brain to cope with such a large phenomenon where the effects are not immediately noticeable. Also, hearing about climate change too much can lead to an anti-reaction if the message is not in line with people their beliefs.

Scepticism



Because the problem seems too difficult people tend to find reasons not to believe it, refrain from acting due to uncertainty or decide to ignore the problem altogether. Also, they reject the belief that change is needed, because it might interfere with the status quo of their comfortable lives.

Motivation



People are generally risk averse and afraid of what is unknown. It is difficult to comply if future performance outcomes, physical risks, social opinions, payback periods, or comfort level are uncertain. Also, if people have already invested time, money or effort in other behaviour they tend to hold on to those behaviour because otherwise those efforts seem wasted.



Limited cognition

Storytelling

Using emotion to tell a story can be more effective than providing information, because through storytelling you can connect with the customer

Tactics

- Avoid jargon
- Start with an anecdote
- Use metaphors to make messages stick
- Create a positive environment that reminds people of a happy moment to reproduce those feelings
- Focus on all senses to create a pleasant environment, such as special lighting, colour use, or sounds.
- Don't focus on doom & gloom

Design tweaks

2

4

16

20

Example



Instead of aiming at the bad excessive use of plastic packaging, the WWF used positivity to critique the plastic industry. They trigger positive emotions through humour, recognizable examples, bright and soft colours, and simplicity to bring across a serious message in a positive way. This way, little resistance is experienced by the consumer, making it easier for them to agree with the message.

Attention points

People remember the first thing they see, the high parts in the middle, and what happens at the end

Tactics

- Add the most relevant argument in the beginning or end, and put the least attractive in the middle.
- During a longer process, insert an additional high point to maintain positive experience.
- Offering a gift makes people feel like they 'win' and creates an automatic happy memory.

Design tweaks

6

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25

39

Example

When leaving the Gamma hardware store, people are given a discount voucher for their next purchase, making it feel like they won something. The last moment of their shopping experience is thus not about spending money, but receiving money creating a positive association with the brand and stimulating their return.





Scepticism

Tailor made tracks

Know what moves your consumer and what their beliefs or values are to provide the message from their perspective

Tactics

- Design your message in line with beliefs and values of the consumer
- Focus on the consumer's personal gains
- Make the message feel personalized
- Seek personal engagement and value people's input
- Use an upcoming big event and hook your message onto that event to easy adoption of your product/ service

Design tweaks

7

24

30

32

Example

As supermarket Albert Heijn registers consumer purchases, they assign the consumer individual discount on specific products interesting to the customer. Because consumer feel personally rewarded above others, they tend to find that specific product more interesting than they otherwise would.



Value targeting

To get people to change, they need to feel associated with the message. Presenting the content in a way that addresses the consumer's morality makes them feel obliged to act

Tactics

- Connect your product to the identity and underlying values of the consumer
- Point out aspects that determine people's identity to make them feel responsible
- Use visualization that shows the effect of their moral versus immoral behaviour
- Show direct positive result if people comply immediately to your moral call for action

Design tweaks

14

33

38

43

Example

The WWF brought a distant problem closer through direct a visual effect to make people feel morally obliged to decrease their paper tower use. By directly showing their personal effect, people were made to feel responsible and make people no longer able to disassociate their selves from the effect of their behaviour.





Motivation

Gain vs. loss

People don't like losses and will try to avoid them, even if the choice is risky. They do more to avoid pain than they will do for a gain

Tactics

- If the outcome is uncertain use loss frame, if the outcome is certain use a gain frame.
- To emphasize the cost present it on its own, if you want to de-emphasize costs embed it.
- Small financial rewards don't speak to our intrinsic motivation and are thus not persistent.
- Present your product/service for a limited time to make it seem scarce, making people purchase it quicker to avoid the chance of losing it

Design tweaks

8

31

37

50

Example

"You are currently losing €5 by not consistently turning off you lights" is more effective than "you could reduce your €125 electricity bill to €120 if you consistently turned off you lights".



Emotional steering

People trust their feelings and if the outcome feels uncertain, their refrain from acting. It is therefore important that the perceived pros outweigh the cons

Tactics

- Don't present all the information at the same time, but focus on a surprise element to keep attention
- Link the desired behaviour to an existing physical or emotional experience
- Use surprise elements to shift attention from the cons to the pro
- Focus on an at least equally or more comfortable new status quo when new behaviour is performed

Design tweaks

9

21

35

41

Example

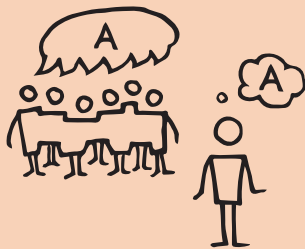
In a test to get a higher and faster response rate the Dutch Tax and Customs Administration sent out letters with post-its on them saying "Thanks for filling in your tax return :)" written in handwriting. By adding a note, people

feel personally addressed. Results decreased response rate by over half.



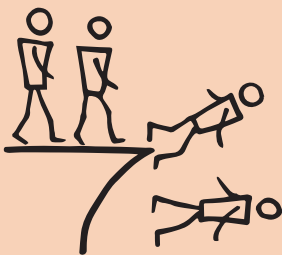
Social norm

Social opinion



People are social animals and are constantly forming judgments according to their peers. They are more inclined to agree with those they favour, and will change their opinion to be favoured in return. A person's values and opinions are determined by the people that surround him/her. Therefore, inaction can also lead to a social dilemma problems.

Herd behaviour



People feel they behave autonomously, but are constantly steered and triggered by behaviour that is performed by others. This behaviour may differ from their subjective norms due to the desire to follow popular behaviour. By constantly comparing their behaviour with that of others, people are inclined to follow each other and show clear herd behaviour.

Mistrust



When people hold negative views about a messenger they are unlikely to take directions from them. The type of source and the content of the message determines the level of trust they experience. If people trust that the change is effective, worthwhile and honest they are more likely to comply. Trust is difficult to gain, and easily damaged, but very important in believing a message and the willingness to change.



Social opinion

Social comparison

Informing people on the performance of their peers, makes them want to perform similar or better

Tactics

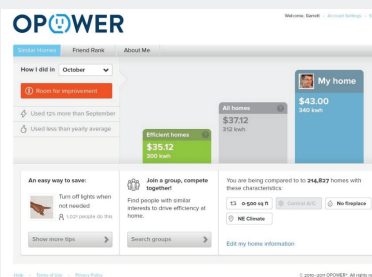
- Show the consumer their behaviour and that of their peers
- Make scores and rankings public
- Focus on comparisons with peers or nearby people because it increases relevance and stimulates improvement more
- Show peers promoting your product/service as status increasing

Design tweaks

1 18 19 44

Example

By presenting homeowners with their energy use compared to their neighbours, OPower stimulates a decrease in energy use because people want to fit the norm. Other research showed that when people already had a lower energy bill, a



simple smiley face indicated enough social approval to continue using less energy.

Reciprocity

If people get a favour from you they are more willing to give something in return or compensate for your effort

Tactics

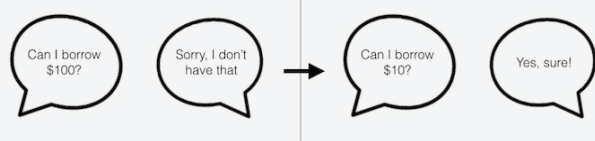
- Add an extreme alternative to make your desired behaviour more attractive
- Requests should address an existing social norm
- Ask for a request soon after your favour
- By personalizing a user experience, people feel the need to repay you for the extra effort
- Focus on a genuine gift that increases social feelings
- Give an unexpected extra gift

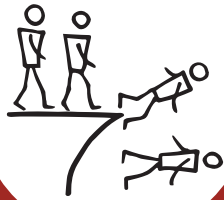
Design tweaks

6 8 15 37

Example

First ask people for a too big request which they will most likely reject. If you then ask them for a smaller favour (the one which you wanted in the first place), they are more likely to comply because they feel obliged to settle in the middle. Similarly, if you first ask people for a small favour which they accept, they are more likely to do you a bigger favour later.





Herd behaviour

Personal contact

People are more susceptible to information spread through personal contact or if they are led by example of similar consumer

Tactics

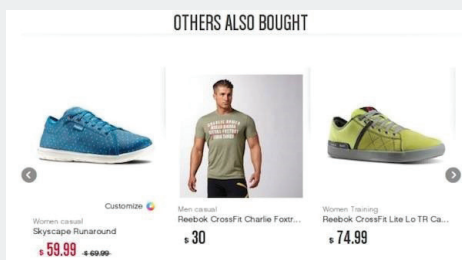
- Have a community leader promote your product/service
- Offer face-to-face consumer support
- Pre-select follow up options for the consumers that have been previously chosen by their peers
- Show success stories experienced by peers
- If there is no personal contact, make the customer feel like they are personally addressed or supported by their peers

Design tweaks

31 38 42 43

Example

By pre-selecting suggestions according to what peers did many online shops try to make consumer purchase more. Because others bought these items, consumers are more likely to also buy those products to prevent them from falling outside the group.



Social commitment

People care more about performance, possessions and well-being relative to others

Tactics

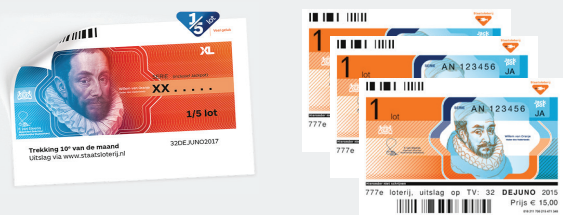
- Focus on a what, when and how a commitment can be made.
- Ask people for a confirmation, because they are more likely to stick to it.
- Small commitments like a social media follow can be enough to activate people at a later moment.
- Make the commitments people make public to increase social pressure to keep them.
- Use mirrors or eye-watching posters to make people feel like they are being watched

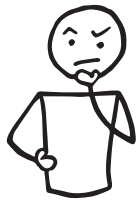
Design tweaks

5 26 34 45

Example

By first asking for only a small commitment, such as 1/5th of a lottery ticket people are more likely to comply. Once consumers have already made this initial commitment they are more likely to continue their membership and expand to a full lottery ticket the next months.





Mistrust

Trust

Role model & authority

People trust the messenger more when there's a shared goal and they have the feeling the messenger is genuine and they are in it together

People tend to follow behaviour performed by a role-model of comply to authority messages

Tactics

- Present transparent and consistent messages
- Show one of your shortcomings to give people the feeling you are integer and trustworthy. This will make your strength more believable.
- Focus on what people are already trying, not on what they do wrong to make them feel appreciated
- Don't focus on disproving the distrust, but highlight what's to trust

Tactics

- Show role models performing the behaviour, it makes people want to do the same
- Only focus on desired behaviour because it makes that behaviour the new norm
- Framing the message so that it shows that the desired behaviour is promoted by peer is more effective than your opinion

Design tweaks

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Design tweaks

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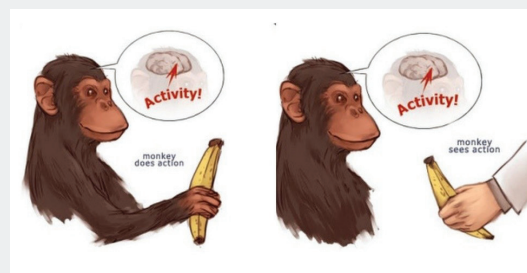
47

Example

Earning trust can be done through role models and examples, but also through imagery. By placing images next to your message like the ones below, the message is intuitively strengthened because people relate ropes tied to safety.

Example

Our brain is activated in the same way when we perform a behaviour as well as when we see a behaviour. By showing the desired behaviour, our brains is more likely to accept and then imitate that behaviour.



Efficacy

Too distant



Climate change is a very big and distant problem, which makes it very hard to grasp. There is too little perceived or felt urgency and investments will take a long time to pay back. If a choice does not show quick results or the time spend researching might not be rewarded there's less reason to invest.

Perceived control



Because climate change is a global problem, people can feel powerless. They feel like they don't know what to do, don't have the (financial, physical, psychological, practical) sources, or that their actions will have no impact on a larger scale anyway.

Autonomy



People want to feel in control of their decisions and actions. If they don't feel like they have power to decide, they tend to resist the desire to change. If the desired action conflicts with the existing goals, it is hard to force people into a certain behaviour if they don't feel like it is their choice.



Too distant

Goal setting & feedback

Smaller goals and immediate feedback keep people motivated to keep up their performance, and increasing urgency increases motivation

Tactics

- Give clear feedback right after executed behaviour
- Show progress and increase the need to make a change now through using urgency as a stimulator
- Focus on good behaviour and use emotional rewards such as smiley's to those who do best
- Don't present more than 5-9 items at the same time
- Divide a difficult task into multiple smaller steps
- Set a deadline for each checklist step
- Visualize the progress consumers have made

Design tweaks

5

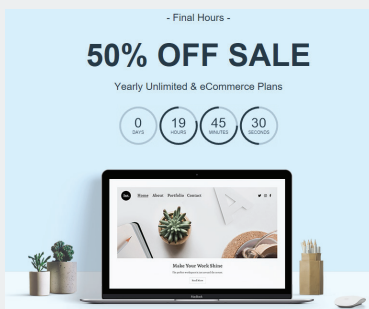
8

36

45

Example

To make people feel like there is no time left to make a decision Wix.com used a time frame to show urgency. At the same time they use circle diagrams to visualize the



progress of the time left creating visual stimuli for people to start acting.

Guarantees & free trials

Offering free trials or guarantees decrease the threshold to try out new behaviour and can eventually increase the chance of people adapting to the new behaviour

Tactics

- Give people free trials to make them experience the service and make it their own
- Take away physical and practical barriers such as installation or delivery
- Make people bond with your service/product during the engagement to keep them connected to it.
- Give the customer a gift in the beginning or end of their experience

Design tweaks

29

34

37

46

Example

When ordering food online the supermarket chain Albert Heijn always includes several additional products as test samples to make people familiar with new product that might be interesting to consumers according to what they ordered. Simultaneously this tactic includes a tailor-made



free sample giving and a surprise element.



Perceived control

Minimum effort

People are programmed to favour the paths of least resistance, so make the desired behaviour that takes the least effort

Tactics

- Make the sustainable option the default option without putting too much attention on it.
- Make consumers feel like you are taking work out of their hands
- The next step should be mentally and physically close by to avoid undesired behaviour
- Don't offer multiple steps at the same visual screen, but rather offer steps in steps to avoid information overload

Design tweaks

3 13 26 40

Example

People inherently want to take the easiest route, so they tend to stick to the recommended or default option. Changing the default can have large impacts without having to change the customers attitude. In countries where the default option is to donate organs the participation rates are much higher than if the country has an opt-in default option.

Default Opt-out

Tick the box if you want to participate in the organ donor program

Opt-in rates: 10-20%

Default Opt-in

Tick the box if you do not want to participate in the organ donor program

Opt-in rates: 90-100%

Landscaping

Decreasing the amount of options and creating an atmosphere can help to unconsciously lead people to make the desired decision

Tactics

- Don't present more than 5-9 items at the same time
- To make the desired option more attractive highlight it or add an undesirable option
- Use when people already have positive beliefs about the desired behaviour
- Think about the option you provide the consumer, because they influence their decision making
- Insert next action cues to stimulate the desired next behaviour

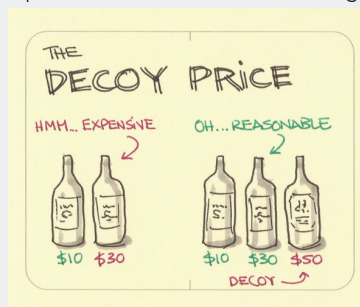
Design tweaks

27 30 40 46

Example

When you offer people two option they tend to choose the cheapest option, but if you add another option with an even less desired option people will choose the most expensive option because that feels like to highest gain. In this way the

options don't change, but the context around it is changed to get the desired option.





Autonomy

Self-persuasion

People are best convinced if they convince themselves, because they rely most on their own opinions

Tactics

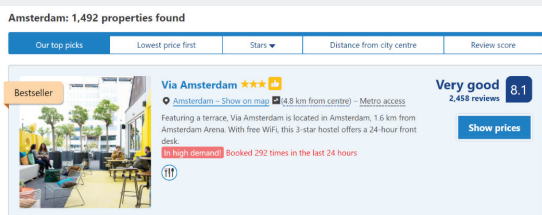
- Skill adjustment is more effective in small steps than in one attempt
- Give people a head start making them feel capable of completing the desired behaviour
- Frame the task as not yet complete instead of not yet started
- Make people feel they have a choice, or say, and are free from external pressure to prevent resistance

Design tweaks

9 14 24 40

Example

By pre-setting the criteria, a customer will judge their decision to these options (such as rating or location). Showing that there are only a small number of rooms still available makes people feel they should decide instantly because they don't want to miss out on a potentially good room. They feel like they have decided, whilst Booking.com choose for them.



Initiation

When people feel like they have started a task they automatically want to finish it

Tactics

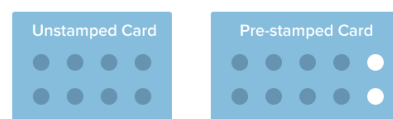
- Make the first step to start the process as easy as possible, even if it is not necessary for the behaviour
- Make the next action take a little effort as possible
- Reward the customer before or as soon as the first or next step has been performed
- Show the customers how easy it is to complete the behaviour

Design tweaks

7 36 37 41

Example

By giving the consumer an initial boost, they don't have to overcome a threshold preventing them to start Giving people a stamp card where there has already been made a start increases the desired of customer to finish the card, even if the same number of stamps still have to be obtained.



Pre-stamped reward card resulted in 178% more repeat business

Design tweaks

People are drawn to visual information because it allows their brain to make easy connections with existing information in their mind. There is no one size fits all, and it is always a matter of taste. However, by applying some these design tweaks the message can be improved to trigger the brain into perform the desired behaviour.

Content



1. Use clear and short headings
2. Use familiar and easy words or phrases
3. Present maximum 5-9 items at the same time
4. Use anecdotes and emotion through storytelling
5. Present your information in steps or with an action plan
6. Surprise the customer by offering something new or keeping them curious
7. Link to existing belief and refer to familiar designs
8. Show praise and give rewards if desired behaviour is performed
9. Use story-editing by slightly changing their current behaviour and opinion
10. Acknowledge your small weaknesses to then highlight your strengths

Text



11. Use clear fonts for high speed reading and decorative fonts for attention
12. Use short line lengths and multiple columns for easy and quick reading
13. Present bite sized chunks to make the message stick
14. Use nouns such as “be a donor” over verbs such as “donate now”
15. Simplify
16. Think about the effects and meaning of each word
17. Present text in bullet points, sequences, or action plans for overview
18. Present information about injunctive norms visually and use numbers
19. Be transparent about your aim and state conclusion
20. Use clear metaphors and analogies

Layout



21. Emphasize quick choices by speaking to unconscious mental shortcuts
22. Use symmetry
23. Place the main message central and keep the borders clean for overview
24. Use familiarity and focus on consumer's expectation to guide the user
25. People first look left at the top, then to right and then down
26. Place the next step close to current step
27. Use grids or clear separation to create overview
28. Use a lot of blanc space to keep the focus on the right message
29. Cluster information together to help categorize
30. Only present the relevant information, too much information is distracting

Call to action



31. Play into the expectation and perception of the user
32. Use images showing positive moods and happy feelings
33. Highlight the next step, through alerting and sending reminders
34. Make each click a small commitment
35. Don't present all the information at once to make people curious
36. Show that people can click on information or use buttons indicating action
37. Give customer an initial boost
38. Use arrows or role models (in pictures) to show where to look next
39. Visualize how far along in the process the user is and make the end salient
40. Make the default look like the most attractive option

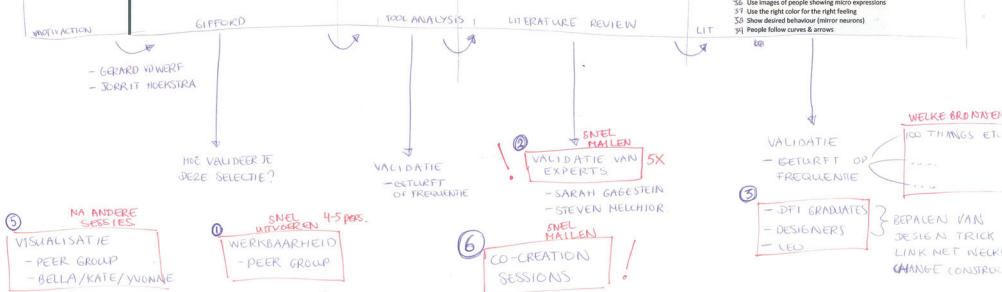
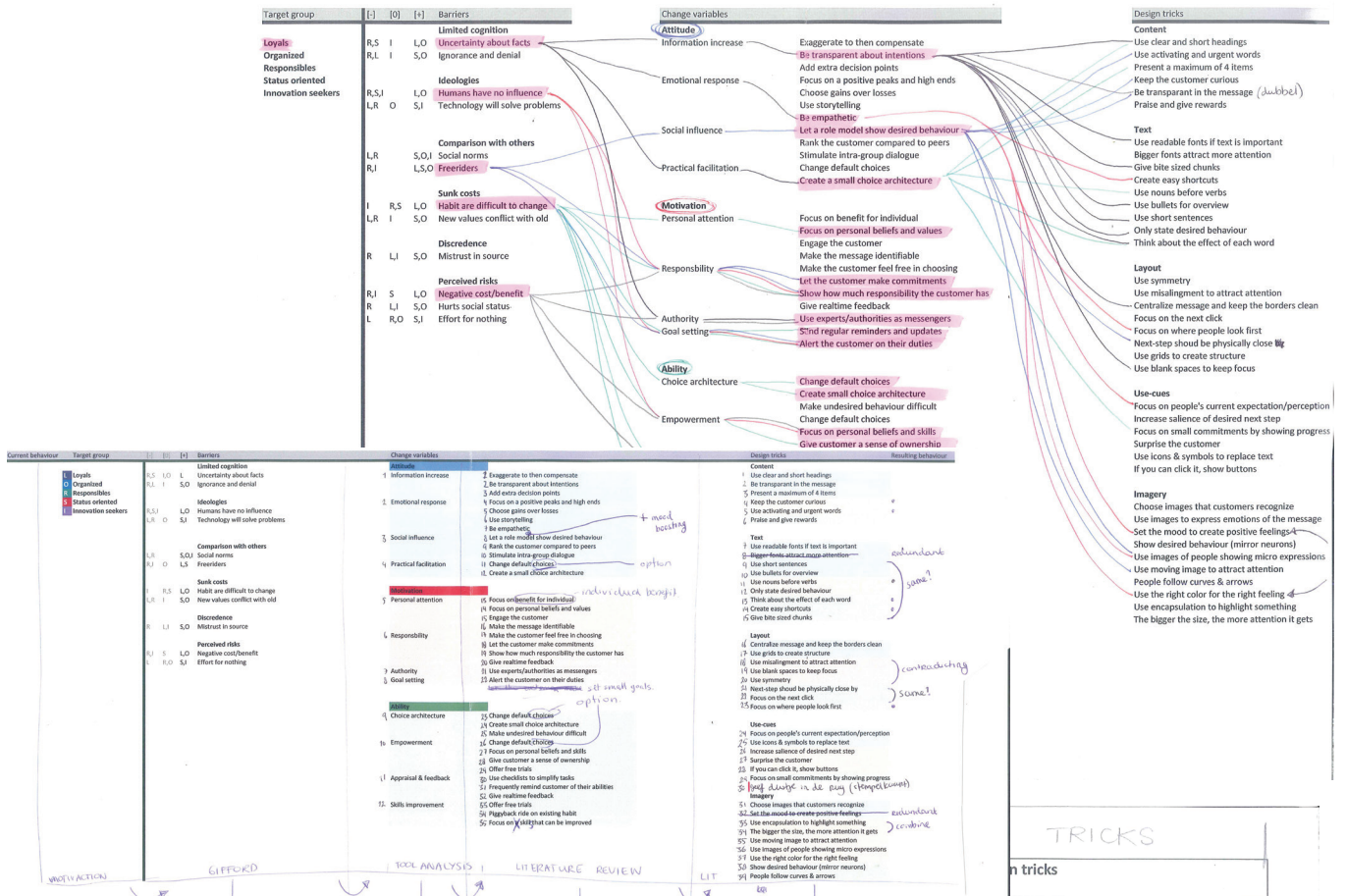
Imagery



41. Focus on attractive images and positive mood
42. Show role-model or images performing the desired behaviour
43. Use people with micro-expressions to trigger the same emotion
44. Use icons & symbols to easy information
45. Use curves & arrows to guide the user
46. Exaggerate elements by encapsulation, changing shapes or different sizes
47. Choose recognizable images
48. Think of the effects of colour and sounds
49. Be consistent in colour use to link elements together
50. Use humorous nudges

XII. BRAINSTORM

BRAINSTORM - PHASE 1



TRICKS	
existing belief (content)	7
low expectation/perception (use-cues)	8
emo expressions (imagery)	9
sized chunks (content)	10
tracking (Layout)	11
s & symbols (imagery)	12
nouns over verbs (text)	13
sized chunks (content)	14
or neurons (imagery)	15
boost (use-cues)	16
ur use (imagery)	17
es & arrows (imagery)	18
red behaviour (use-cues)	19
red behaviour (use-cues)	20

SKEPTICISM				
3. Motivation <i>WILLEN</i>	3.1 Expectation	Built up (but that's not all...)	7	- Salience next step (use-cues)
		Vivid appeals	8	- Moving images/text (imagery) - Focus on next click (layout)
4. Self-efficacy <i>KUNNEN</i>	3.1 Goal-setting	Action plan (bullet points)	9	- Recognizable visuals (imagery)
		Rhetorical questions	10	- Positive moods & colours (imagery)
4. Self-efficacy <i>KUNNEN</i>	3.3 Inter-temporal trade-off	Guarantees/free-trials	11	- Centralize and white space (lay-out)
		Scarcity/inevitability	12	- Bite sized chunks/4 items (content)
		Self-persuasion (misleading questions)	13	- Activating and urgent words (text)
		Landscaping (limited choice, determine decision criteria, more than yes/no answer)	14	- size, font & highlights (imagery)
4.2 Skills	4.1 Engagement	Minimum effort/unburden	15	- Centralize message & cleanliness (layout)
		Piggyback	16	- Labelling options (use-cues)
			17	- Mirror neurons (use-cues)
			18	- Focus on next click (layout)
			19	- Nouns before verbs (text)
			20	- Highlighting & size (use-cues)
			21	- Bite sized chunks (content)
			22	- Curves & arrows (use-cues)
			23	- Focus on next step (use-cues)
			24	- Focus on next step (use-cues)
			25	- Focus on next step (use-cues)
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			33	- Focus on next step (use-cues)
			34	- Focus on next step (use-cues)
			35	- Focus on next step (use-cues)
			36	- Focus on next step (use-cues)
			37	- Focus on next step (use-cues)
			38	- Focus on next step (use-cues)
			39	- Focus on next step (use-cues)
			40	- Focus on next step (use-cues)
			41	- Focus on next step (use-cues)
			42	- Focus on next step (use-cues)
			43	- Focus on next step (use-cues)
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			71	- Focus on next step (use-cues)
			72	- Focus on next step (use-cues)
			73	- Focus on next step (use-cues)
			74	- Focus on next step (use-cues)
			75	- Focus on next step (use-cues)
			76	- Focus on next step (use-cues)
			77	- Focus on next step (use-cues)

BRAINSTORM - PHASE 2

The change goals	The receivers	The barriers	The change variable	The design tricks
Intention change 1	Loyals	Limited cognition + RO Uncertainty LO RL Ignorance SOO	Attitude Information provision	Content
Intention change 2		Ideologies + ROI Suprahuman LO LR System justification OI	Emotional response	
Intention change 3	Structured ORGANIZED	Comparison with others + LR Social norms OIS RI Prisoners dilemma LOS	Motivation Personal interest & engagement	Text
Intention change 4	Responsibles	Sunk costs + I Habit retention OL LR Conflicting values SS	Responsibility	Layout
Intention change 5	Status Oriented	Discredence	Authority	Use-cues
Intention change 6	Inn 1 se		Goal setting	Imagery
Intention change 7			Efficacy	

→ physical experience (that goes well)

backcasting sale made by k?



CONTENT	TEXT	LAYOUT	USE-CUES	IMAGERY
1. clear short headings	7. readable fonts	16	24	31
2. leave space	8. big fonts	17	25	32
3. use icons	9. short sentences	18	26	33
	10. bullet points	19	27	34
	before verbs	20	28	35
	also voice	21	29	36
		22	30	37
				38
				39



BRAINSTORM - PHASE 3

Decision constructs influence sustainable behaviour (form behaviour)	Mental barriers Inhibit change within the construct (explain non-behaviour)	Change opportunities Overcome the barriers (can drive behaviour)	Influence techniques Overcome mental barriers on conscious and/or unconscious level (can influence behaviour)	Design tricks help frame the message for a specific influence technique (can stimulate a desired behaviour)
1. Attitude (attitude)	Disassociation (denial, ignorance, values, cynicism)	Personalize (self-interest)	Taylor made tracks (speaking to individual beliefs, engagement, hook on to life changing event) Value targeting (moral obligation) <i>responsibility</i>	- Link to existing belief and familiar design (content) - Follow expectation/perception (call to action)
2. Social norms (subjective norm)	Limited cognition (knowledge deficit, numbness, bias)	Inform	Storytelling (empathy, mood setting) <i>metaphors</i>	- Micro expressions (imagery) - Bite-sized chunks (content) - Eye-tracking (Layout) - Icons & symbols (imagery) - Focus on next click (layout) - Nudges
3. Effectiveness (perceived behavioural control)	Disincentive (economic, uncertainty, risks, change status quo, negative sum)	Motivation	Gain vs Loss framing <i>frame costs, loss aversion</i>	- Recognizable visuals (imagery) - Think about effect of each word (text)
1. Attitude	Social opinion (peer knowledge/conversation, norms, values, social dilemma)	Social pressure (commitments vs belonging)	Reciprocity (giving back/door in the foot/face) <i>engagement</i>	- Noun activate more than verbs (text) <i>nr 34</i> - Bite-sized chunks (content)
2. Social norms	Herd behaviour/social imitation (value-action, popular behaviour, comparison)	Leadership	Face-to-face (social proof, community leaders, point of purchase, collaborative filtering)	- Show desired behaviour (imagery) - Initial boost (call to action)
3. Effectiveness	Mistrust (bias, disbelief of content, only technology can solve the problem)	Credibility	Trust (shared goals, similarity, transparency) <i>shortcomings</i>	- Link to existing belief and familiar design (content) - Curves & arrows (imagery)
1. Attitude	Too distant (temporal, pay-back time, consequences are not felt)	Urgency	Goal setting & feedback <i>praise</i> <i>extra decision points, alerts, progress</i> Guarantees/free-trials	- Message central and border clean (layout) - Bite sized chunks/4 items (content) - Message central and borders clean (layout) - Present multiple options to highlight best choice (call to action)
2. Social norms	Perceived control (psychological, financial, physical)	Engagement	Minimum effort/unburden (block undesired behaviour, simplification, limited choice)	- Focus on next step (call to action) - Icons & Symbols (imagery)
3. Effectiveness	Autonomy (aspirations, self-efficacy, individual decision)	Persuasion	Self-persuasion (small choice architecture, pre-set criteria) <i>progress</i> Scarcity/inevitability	- Curves & arrows (call to action) - Use max 4-9 items (content) - Highlight next step (call to action) - Show desired behaviour (call to action) - Focus on next click (call to action)

Behavioural factors The constructs that influence sustainable behaviour	Barriers The barriers that inhibit change within the construct	Change constructs The general approach to overcome the barriers	Influence techniques The specific tactic that can be used to overcome the barrier	Design tricks Tips on design elements to help frame the message for the specific influence technique
1. Attitude	Disassociation (denial, uncertainty, ignorance, scepticism) Limited cognition (knowledge deficit, bias, numbness)	Personalize Inform	Taylor made tracks (speaking to individual beliefs, engagement) Storytelling (empathy, mood setting) Attention points (beginning, middle, end)	- Link to existing belief and familiar design (content) - Follow expectation/perception (call to action) - Micro expressions (imagery) - Bite-sized chunks (content) - Eye-tracking (Layout) - Icons & symbols (imagery)
2. Social norms/subjective norm	Social inequality (comparison, norms, values) Mistrust (initial reaction, disbelief of content, only technology can solve the problem)	Social pressure Credibility	Reciprocity (giving back/door in the foot) Social commitments (belonging to the group, comparison) Trust (shared goals, transparency) Role-model/authority (showing desired behaviour)	- Noun activate more than verbs (text) - Bite-sized chunks (content) - Show desired behaviour (imagery) - Initial boost (call to action) - Link to existing belief and familiar design (content) - Curves & arrows (imagery) - Show Desired behaviour (imagery) - Salience next step (call to action)
3. Motivation	Perceived risks (already spent money in other things, poor performance, change in living comfort)	Expectation	Gain vs. Loss Vivid appeals & Rhetorical questions	- Moving images/text (imagery) - Focus on next click (layout) - Recognizable visuals (imagery) - Think about effect of each word (text)

Table with behaviour change steps

Behaviour construct the type of behaviour we can address	Barrier The barrier that inhibit change for this behaviour	Change construct the general way to approach the barrier	Influence technique the specific tactic that can be used to overcome the barrier	Design trick Tips on design elements to help frame the message for the specific tactic
1. Attitude	Disassociation (denial, uncertainty, ignorance) Limited cognition (incent bias, numbness discounting)	Personalize Inform	Taylor-made customer journeys/engagement Storytelling (empathy, mood setting) High peaks (beginning, middle, end)	- Link to existing belief (content)** - Follow expectation/perception (use-cues) - Micro expressions (imagery) - Bite-sized chunks (content) - Eye-tracking (Layout) - Icons & symbols (imagery)
2. Social norms	Social inequality (comparison, norms, values) Mistrust (reactance, program inadequacy, techno solution)	Social pressure Credibility	Reciprocity (foot in the door/door in the foot) Social commitments/consensus Trust through shared goals and transparency Role-model/authority showing/telling desired behaviour	- Use nouns over verbs (text) - Bite-sized chunks (content) - Mirror neurons (imagery) - Initial boost (use-cues) - Transparent appearance (content) - Curves & arrows (imagery) - Desired behaviour (use-cues) - Salience next step (use-cues)
3. Motivation	Perceived risks (bank costs, functional, system justification)	Expectation	Built up (but that's not all...) Vivid appeals & Rhetorical questions	- Moving images/text (imagery) - Focus on next click (layout) - Recognizable visuals (imagery) - Activating and urgent words (text)
4. Effectiveness	Distance (temporal, usability, powers)	Inter-temporal trade-off	Goal setting (action plans) & feedback Guarantees/free-trials Scarcity/inevitability	- Centralize and white space (lay-out) - Bite sized chunks/4 items (content) - Centralize message & cleanliness (layout) - Labelling options (use-cues) - Mirror neurons (use-cues) - Focus on next click (layout)

* - the psychological barriers to climate change by Robert Gifford
** - The part of message design this trick belongs to

Jessie van Hattum April 11, 2018
Kies vooral technieken dit inhaken op het probleem:
- Rolmodellen
- goal setting (efficacy)
- Guarantees/free trials (utilitaristic outcomes uitkomsten)
- self-persuasion (identity)

Als je kiest voor bewust **barrières** en **factoren**, haak dan ook aan op deze met bewust **psychologie**.

Reply Resolve

Jessie van Hattum... if this will be in the form of a **video**

Jessie van Hattum... Word gevormd door je **waarden**

Jessie van Hattum... Barrières hieronder: **↓**

Jessie van Hattum...

Jessie van Hattum... Limited **engagement** lijkt onbevust.

Jessie van Hattum... Laat deze gaan, te complex

Jessie van Hattum... Kan je ook **splitsten**...

Jessie van Hattum... Gaat niet over **reactie**.

Jessie van Hattum... Dit klopt niet... **puur bij sketicisme**

Jessie van Hattum... **Motivation** is geen onderdeel **↓**

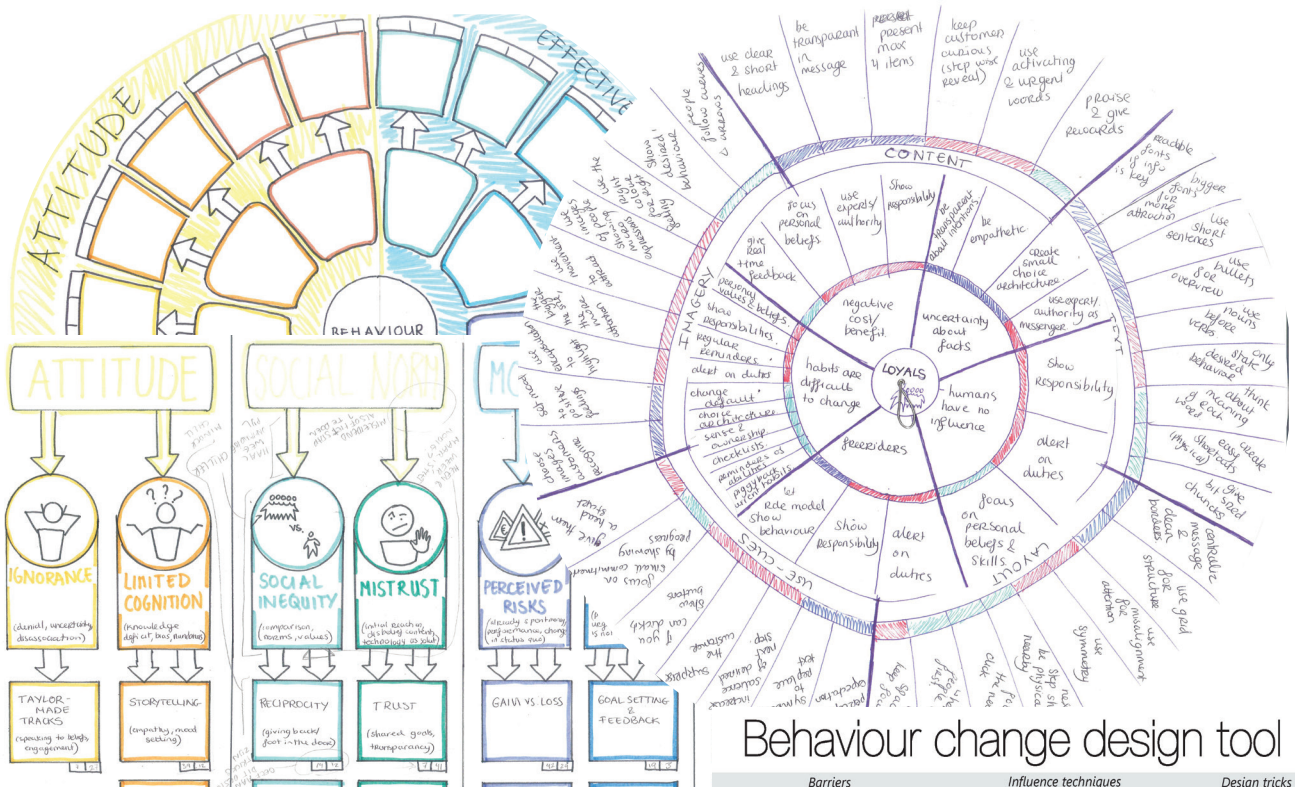
Jessie van Hattum... Zit dan in zijn model **hi**...

Jessie van Hattum... Wat bedoel je met **distance**? **↓**

Jessie van Hattum... **"weerstand** tegen een **↓**

- Unknown Author** ik snap de zin wel maar ik snap niet waar het op slaat.
- Unknown Author** Mensen negeren het probleem doordat ze het **oplossen** niet meer goed zien omdat het er altijd al is?
- Unknown Author** Geen idee wat je hier mee bedoeld
- Unknown Author** ik snap de zin wel maar ik snap niet waar het op slaat.
- Unknown Author** ik wist niet wat **splitsten** was. Maar wat is technso? ik ken geen pillen party toch?
- Unknown Author** ik kende het woord niet maar had wel goed geschat wat het betekend
- Unknown Author** ik kende dit woord niet

BRAINSTORM - PHASE 4



Behaviour change design model

Barrier	Influence technique	Design trick
Limited cognition Knowledge deficit, numbers, bias, cognitive dissonance	Storytelling: Emotion, mood setting, narrative, anecdotes Attention points: Place the focus on the beginning, middle, and end	2 4 16 20
Disassociation Denial, ignorance, values, cynicism	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	6 23 25 39
Disincentive Negative sums, losing prior investment, uncertainty, risks, changing status quo	Gain vs loss: Scarcity, loss aversion, end framing, value boost Emotional steering: Surprise effect, story-telling, heuristics	8 31 37 50

Behaviour change design tool

Barriers	Influence techniques	Design tricks
Limited cognition Lack of knowledge, numbers, bias, cognitive dissonance	Storytelling: Set the mood using empathy and anecdotes Attention points: Place the focus on the beginning, middle or end	2 4 16 20
Scepticism Denial, ignorance, conflicting information, different personal values, disbelief	Taylor made tracks: Engage by connecting to people's personal beliefs Value targeting: Focus on people's morals, responsibility and self-interest	7 24 30 32
Motivation Not enough benefits, sunk costs, uncertainty, risks, changing status quo	Gain vs. loss: Focus on people's desire to keep what they already have Emotional steering: Focus on emotions and subtle elements to enthuse people	8 31 37 50
Social opinion Peer pressure, conventions, norms, values, prisoners dilemma	Social comparison: Focus on status and rank people's behaviour compared to their peers Reciprocity: By making a nice gesture, people feel obliged to return the favour	1 18 19 44
Herd behaviour Popular behaviour, mindless following, competition, inequality	Personal contact: Focus on face-to-face contact of peers to bring across the message Social commitment: Speak to people's desire to belong to the group and keep their promises	6 9 15 37
Mistrust Disbelief of messenger or content, disbelief in human solutions	Trust: Be transparent, show weaknesses and focus on shared goals Role-model & authority: Show desired behaviour to set a new norm on how to behave	10 11 22 28
Too distant Problem is too big, too long pay-back time, consequences are not felt	Goal setting & feedback: Set interim goals or alerts and give feedback on progress Guarantees & free trials: Offer opportunities to test new behaviour through refunds of testing	5 8 36 45
Perceived control Psychological, financial, physical	Minimum effort & unburden: Create a path of least resistance for people to follow Landscaping: Change the default, pre-set the decision criteria and highlight the desired choice	3 13 26 40
Autonomy Aspirations, self-efficacy, control over individual decisions and actions	Self-persuasion: Create a small choice architecture, but give people the feeling it is their own decision Autonomy: Give people an initial boost or highlight their personal skills	9 14 24 40
Effectiveness		
Too distant Problem is too big, too long pay-back time, consequences are not felt	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25
Perceived control Psychological, financial, physical	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25
Autonomy Aspirations, self-efficacy, control over individual decisions and actions	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25

Behaviour change design

Barrier	Influence technique	Design trick
Limited cognition Knowledge deficit, numbers, bias, cognitive dissonance	Storytelling: Emotion, mood setting, narrative, anecdotes Attention points: Place the focus on the beginning, middle, and end	2 4 16 20
Disassociation Denial, ignorance, values, cynicism	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	6 23 25 39
Disincentive Negative sums, losing prior investment, uncertainty, risks, changing	Gain vs loss: Scarcity, loss aversion, end framing, value boost Emotional steering: Surprise effect, story-telling, heuristics	8 31 37 50
Social opinion Peer pressure, conventions, norms, values, social dilemma	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25
Herd behaviour Popular behaviour, mindless following, competition	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25
Mistrust Disbelief of messenger or content, disbelief in human solutions	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25
Too distant Problem is too big, too long pay-back time, consequences are not felt	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25
Perceived control Psychological, financial, physical	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25
Autonomy Aspirations, self-efficacy, control over individual decisions and actions	Taylor made tracks: Increase personal relevance and address personal values and interests Value targeting: Addressing the customer's morality makes them feel obliged to act	1 6 11 25